Gas Journal

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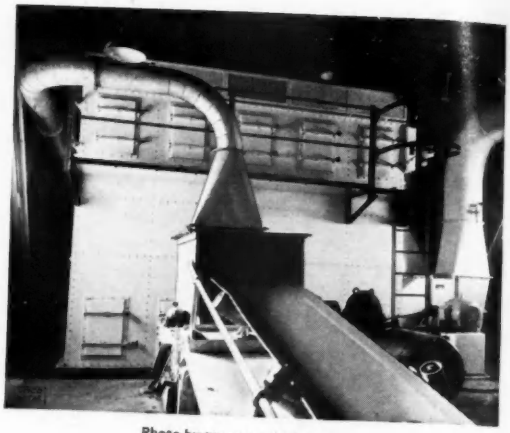

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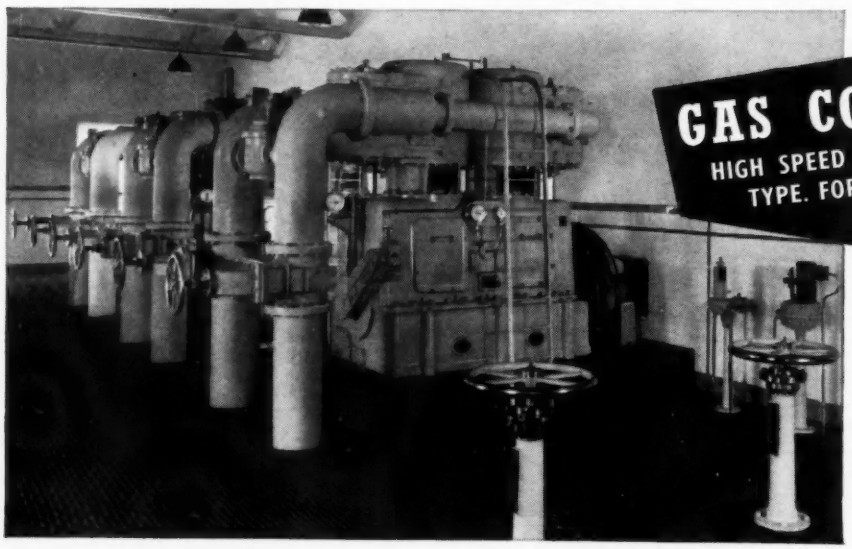

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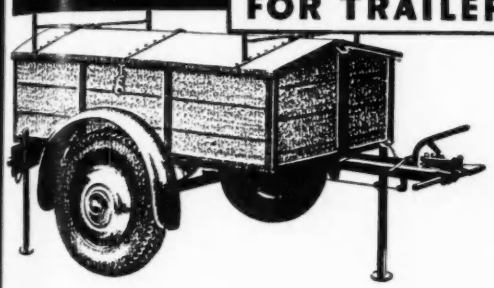

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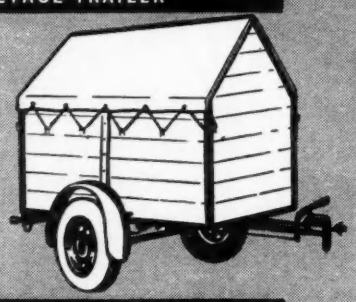

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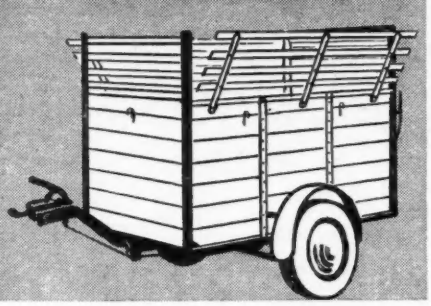

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Gas Journal

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110TH YEAR

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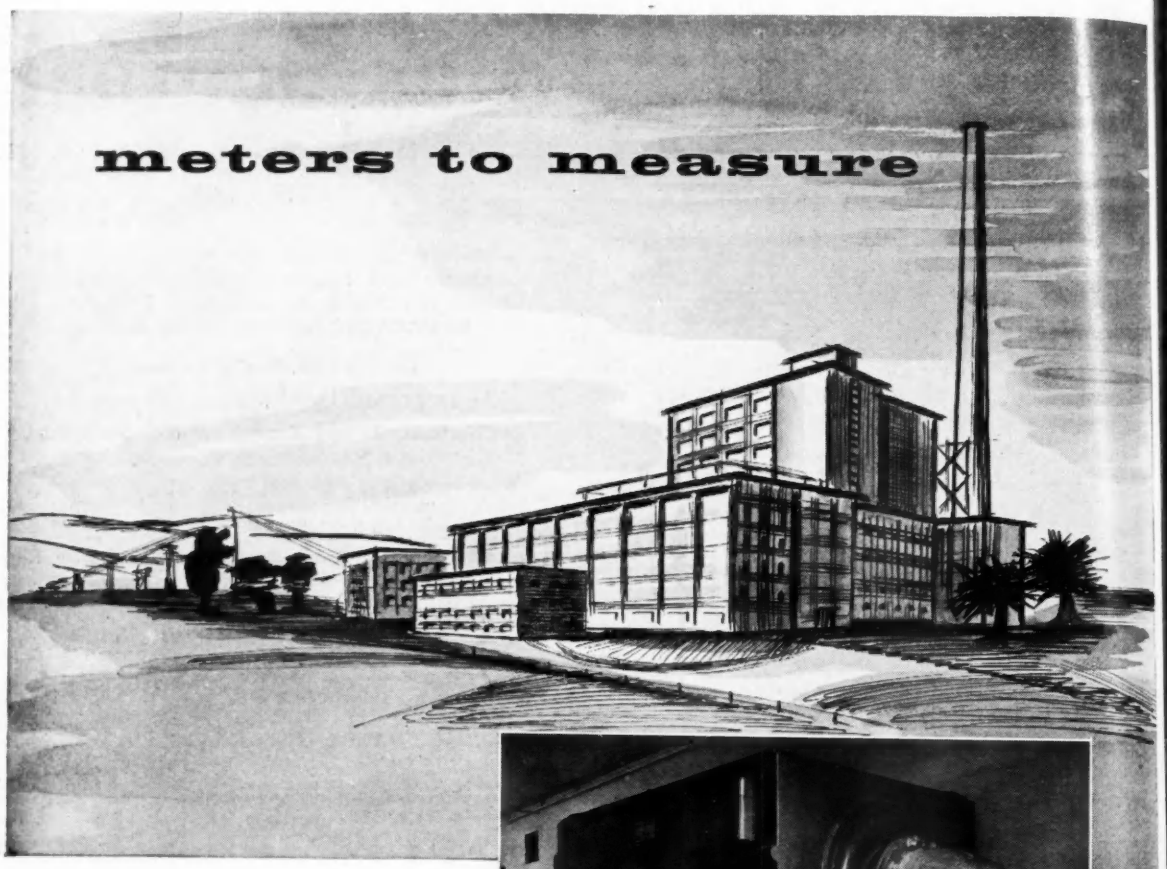

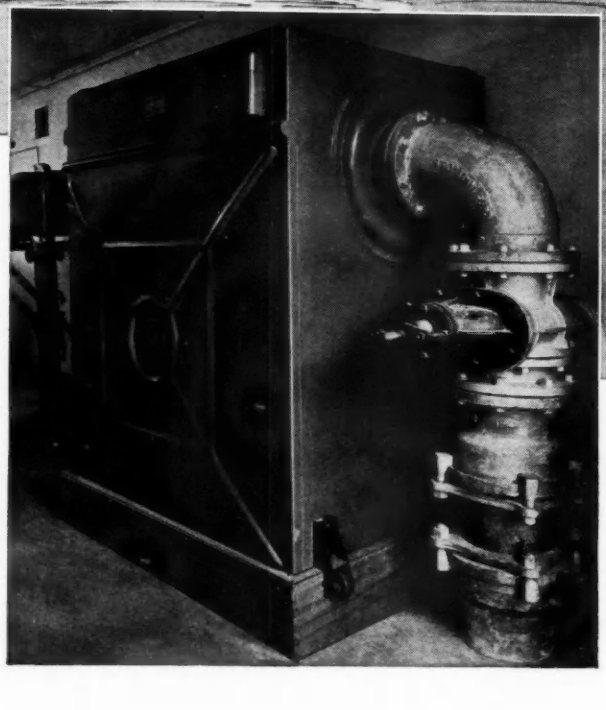

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Gas Journal

VOLUME 296. No. 4971 OCTOBER 22, 1958. 110th YEAR

A Tempting Tariff

LAST week we commented on the annual reports of the Gas Council and the area boards, referring in particular to the variety of new forms of gas manufacture which are being pursued in different parts of the country. It is in the field of gas production that the most interesting developments are to be seen; in general the sales side is remarkably static. Appliance sales fluctuate according to the controls placed on them—at the moment they have increased considerably as a result of the recent relaxation of hire purchase restrictions—but nothing significant has happened to develop any one market.

As we see it, there are three ways of improving the sales situation: (i) Producing a type of appliance which will stimulate an existing load or, preferably, open up a new one; (ii) organising an all-out sales offensive; (iii) providing a price incentive (gas or appliance). Unfortunately there is no sign at present of any progress in the fields of laundry drying, domestic incineration, or any of the other lines of development except perhaps house heating. And at risk of offending those who are trying hard, we cannot truthfully say that we have noticed any very real sales drive. In the third category, however, there has been some progress, particularly in the fashioning of attractive tariffs. Certain boards now offer gas on terms which are keenly competitive, and evidence suggests that these new tariffs are attracting business—although it would also seem that in some cases the public has not yet been made sufficiently aware of the advantages to be gained.

No accusation about hiding its light under a bushel can be levelled at the Northern Gas Board which, as briefly announced in last week's issue, has introduced very attractive new two-part tariffs. Mr. E. Crowther should be pleased by the publicity which this move has achieved, the more so because it is partly the result of the exceptionally good housekeeping practised by this Board. A careful look at the new tariffs and the tariff which they replace is not unrewarding.

The Board has been offering gas on a universal tariff common to all consumers. Under this tariff the first 30 therms consumed in each quarter in each set of premises are charged at 23½d. per therm. For gas in excess of 30 therms per quarter but not exceeding 5,000 therms in winter (2,000 therms in summer) the price is 15.67d. per therm, and further reductions are made for still larger consumptions. Although this tariff is simple and convenient to operate, it is difficult to publicise adequately the lower prices attached to the second and subsequent blocks, and its form tends to over-emphasise the basic (higher) price and thus makes expansion of gas sales less easy than the second-block price justified. There is also a case for giving particular attention to the intermediate range of commercial and industrial consumers by means of more attractive tariffs, particularly by the provision of additional price reduction steps between 30 and 5,000 therms (2,000 therms in summer).

This tariff is not being abandoned (why not?), but the Board now offers to all consumers who wish to take advantage of the offer, the right to be charged on one of three additional alternative tariffs. These comprise Tariff 'A,' a fixed standing charge of £1 per quarter, with all gas consumed at 15d. per therm; Tariff 'B,' a standing charge of £2 per quarter, and gas at 14d. per therm; and Tariff 'C,' a standing charge of £8 per quarter, and gas at 13d. per therm.

A consumer desiring to change to a two-part tariff must undertake to remain on the new tariff for at least four consecutive quarters, except in the event of his vacating the premises. It will be permissible, however, for him to move upwards (i.e., A to B, or B to C) at any time subject to a fresh undertaking to remain on the newly selected tariff for four consecutive quarters. The new tariffs should be of interest to all consumers of 30 therms or more per quarter. According to their consumption of gas, these consumers can cut their gas bills by 5% or more—in the higher ranges by as much as 10%.

The cost to the Board will obviously depend on the number of consumers who change over. If all who stand to benefit do so the estimated cost will be about £200,000 per year. But the Board is confident that increased sales of gas will follow, and will help to offset this cost. In this we do not think they will be disappointed, for all the evidence of past tariff tailoring suggests that this type of gamble pays off handsomely.

Attractive domestic tariffs are usually aimed at securing a larger slice of the space heating business, but we know of only one board which has made any real effort to bring the cheapness of heating by gas to the public's attention. In our view what is wanted is, first,

a really challenging tariff, and then a full-scale advertising and publicity campaign based on the comparative costs of gas and coal. The fact that gas may appear to be a little more expensive need not be a deterrent because, after all, we are selling a clean, refined fuel, on tap. We are after the person who now has a coal fire, not because of any fanatic love of the dancing flames but simply because she cannot afford to change to another fuel which would free her from the dirt and drudgery. It is up to the gas industry to make that changeover financially possible and then to bring the fact to the customer's attention by every means in its power.

Another load which is crying out for attention—and again it has received it in only one board's area—is that provided by the small domestic gas boiler. There are in this country thousands of houses built between the wars in which the cheaply made and usually unsatisfactory solid fuel boilers are ripe for replacement. With the right tariff there is an excellent case to be put up for gas—and remember that in the range of smaller output boilers gas is substantially cheaper than oil. We very much hope that boards will increasingly give their attention to building up this type of business, which yields the type of load the industry needs.

Problems for the N.C.B.

THE National Coal Board's problems, far from nearing a solution, are growing steadily more complex. The most serious, from a long-term point of view, is the fact that stocks of unsold coal are mounting. At the moment the U.K. figure is in the region of 35 mill. tons, enough for nearly two months' internal consumption, and even with the approach of winter there is little prospect of reducing this to the normal level. The fact is that industrial consumption over the past four years has dropped very substantially, and the downward curve is becoming increasingly pronounced.

Decreasing demand and the consequent anxieties over stocking constitute only one of the coal industry's three main problems, the others being finance and labour. It seems likely that the Coal Board will seek to increase its 'overdraft' facilities, now limited to £75 mill., within the next two months in order to continue putting extra coal into stock and avoid closing pits. But it appears unlikely that this will affect the Board's capital investment programme of about £100 mill. a year for the next seven years, the object of which is to produce 240 mill. tons of coal a year. This is a figure based on the Board's estimate of future demand for coal, but in view of the falling consumption to which we have referred, it seems likely that requirements may be rather less than originally anticipated. But the N.C.B. proposes to carry on regardless, believing that investment is required to improve efficiency and lower costs.

Meanwhile, wage demands continue to give the industry little peace. Indications are that for the miners the honeymoon is over and they will be forced to accept the fact that the industry and the country as a whole cannot afford to give in to their persistent demands. Fortunately, the union is behaving in a thoroughly responsible manner and is giving Sir James Bowman their maximum support in his efforts to save the miners from the worst consequences of the decline in sales of coal. But there are difficult times ahead. The N.C.B. have settled the latest pay claim by offering to raise day wages while asking for a standstill on piecework claims for nine months, and an agreement that Saturday overtime should be worked only at pits which in the Board's view, can produce readily saleable coal. The offer is a sound one, overcoming as it does something of the discrepancy in earnings between the two groups of workers and making a firm bid to hold wages stationary. We hope it works out—but nine months is a long time!

Triple First

LAST week, at a pleasant spot called Hazard Farm, we saw Sir Harold Smith, that well-known pusher of switches, puller of cords and turner-on of valves, perform his celebrated bolt tightening act on a vital stretch of main between Totnes and Ivybridge. By so doing he forged the final link in the South Western Gas Board's grid system which provides for a continuous supply of gas from Evesham in Worcestershire to Penzance in Cornwall—a distance of 295 miles.

It is doubtful whether any gas board can claim to have brought about a greater change in the gas supply in its area. Of the 108 works in operation at vesting date only 34 remain and more will be closed shortly. Basically 12 modern works now feed into the integrated supply system, which permits the interchange of gas between these works as required. The work has entailed the laying of 660 miles of bulk supply mains through widely contrasting terrain, and has lead to a situation whereby this long, straggling, thinly populated area is served by 5,700 miles of main at an average of 115 consumers per mile.

With his central control of gas production at Bath, his new manufacturing processes at Gloucester, his central purchasing office and mechanised accounting, Mr. C. H. Chester is understandably proud of what has been achieved. Now he claims three 'firsts': The first Board to complete a gas grid throughout the whole of the area; the first autonomous body to announce that they will not require to borrow any additional sums of money for capital for at least two years; and the first Board to embark on a scheme to extract the sulphur compound from town gas. This last point relates to the plans recently announced for the building of a hydrogenation plant which will be built in the Avonmouth area. It appears that specifications and tenders are complete for the first stage of the scheme, which will cover the Bristol and Bath districts; the second stage will extend to Swindon, and the third stage will cover Exeter, Torquay and Plymouth district.

Nobody is likely to accuse the South Western Board of being slow to experiment with new ideas. With the Gaz Integrale, Jones and Hall plants, and a small Koppers Hasche plant, all at Gloucester, a Gastechnik plant at Bristol, and now the proposed hydrogenation plant, the area is rapidly becoming a proving ground for the more revolutionary techniques in this country. Even if the new set-up is not 100% succesful— and of course the South Western Board is confident that it will be—the industry can be grateful that someone is prepared to break new ground in this way.

Personal

MISS MARY LEIGH, General Secretary to the Women's Advisory Council on Solid Fuel, is retiring on October 31. Miss Leigh, who qualified as a dispenser at the Leeds College of Pharmacy in 1918, was for 14 years a home service adviser with the Gas Light and Coke Company. Seconded to the Food Advice Section of the Ministry of Food in 1941, she went to N.A.A.F.I. as Restaurant and Welfare Superintendent, and was promoted later to District Superintendent. Miss Leigh joined the W.A.C.S.F. in 1944 as Technical Officer and in October, 1953, was appointed General Secretary to the Council. During the last five years she has represented the Council on many bodies and written a number of leaflets and magazine articles and produced 53 newsletters for the Council: she is an Associate of the Institute of Fuel and a member of the Women's Press Club of London.

MR. T. N. JACKSON, District Manager at the Harwich works of the Eastern Gas Board since nationalisation, retired on September 30. Mr. Jackson joined the Wakefield Gaslight Company in 1909 under Mr. H. Townsend. After service in the 1914-18 war, he was appointed Accountant to the Harwich Gas & Coke Co., Ltd., in July, 1924, becoming Commercial Manager and Secretary in March, 1943. Founder of the Harwich Rotary Club, of which he was President in 1951-52, Mr. Jackson was also on the local Board of School Managers, Essex Education Committee.

MR. DAVID J. THOMAS, South Wales Area Manager of Lancashire Dynamo Group Sales, Ltd., has retired after an association of 30 years with Lancashire Dynamo. He has been succeeded by Mr. F. R. Williams, who has served with him at Cardiff since 1953.

MR. J. S. DAVISON, who in 1953 became Development Engineer at the Royal Exchange and South Bank-on-Tees coke ovens of Dorman Long and Co., Ltd., has retired. Mr. Davison, who joined the firm 45 years ago, was formerly a foreman engineer and later works engineer at several plants.

MR. A. GWYNNE DAVIES, M.B.E., has been appointed Member of the East Midlands Gas Board. He will combine his new duties with those of his present position as Secretary to the Board.

METHANE PIONEER

THE Methane Pioneer, the ship jointly owned by the Gas Council and Constock International Methane Ltd., is now fully converted to carry an experimental cargo of liquid natural gas across the Atlantic, and is about to undergo her trials in and around the Gulf of Mexico. The port of registration will be London.

The trials will last some three months after which the ship will sail for the United Kingdom to deliver the first experimental cargo to the North Thames Gas Board at their Canvey Island marine terminal.

Obituary

MR. G. L. R. PEARCE, who had been with Enamelled Metal Products Corporation (1933), Ltd., for four years as Senior Technical Representative for the chemical industry, has died in West Africa. As a result the venture on which he set out with Mr. Ronald J. Hannaford, a flying sales drive of the African continent, has had to be abandoned.

MR. J. G. DENTON, a senior engineer in the construction department of Humphreys & Glasgow, Ltd., of London, has died at the age of 49 after a long illness. Mr. Denton joined the Company as a 15-year-old youth at the Beckton gasworks.

MR. T. C. PLENDERLEITH, lately of Falk, Stadelmann & Co., Ltd., has died aged 82. Mr. Plenderleith joined and represented them in Scotland until he retired in 1951. Highly thought of by the gas industry throughout Scotland, he served during the first war with the Argyll and Sutherland Highlanders.

CORRESPONDENCE

Keep those speeches short

DEAR SIR,

Before the forthcoming I.G.E. Autumn Research Meetings, may I raise the question of the time allotted to speakers? Prudently hiding from your readers behind the cloak of anonymity, I may dare to say that there are few speakers, however eminent, to whom one wants to listen for more than the officially prescribed times of that required for a 1,000-word presentation of a paper and of 8 minutes for a contribution to the discussion thereof, as laid down in the Institution's rules. Yet time and again these rules are completely disregarded, with the result that many who would wish to speak are crowded out.

The speaker does not often see the glazed eye and the restless movements of the President after perhaps 15 minutes have elapsed; and should the President ultimately decide to ask the speaker to conclude, he often responds by gabbling his remaining written remarks at an unintelligible speed. Seldom does a President 'knock with the mallet' (as laid down) to indicate the speaker must cease, and I realise it must be most embarrassing for him to have to check the loquacity of some of his eminent colleagues.

I feel it may not only combat boredom among the general assembly, but may also conserve your valuable reporting space, if you feel able widely to publicise the Institution's rules concerning these matters.

To avoid offending some of my fellow members, I must for once, alas, sign myself—

M.INST.GAS E.

October 14, 1958.

Diary of Forthcoming Events

October 24.—LONDON AND SOUTHERN JUNIORS: Westminster Technical College, Vincent Square, S.W.1. Symposium on Refinery Gases—'Refinery Gas Production' by A. K. Davis, and 'Some Methods for Reforming Refinery Gases' by W. J. Cutler. 6.30 p.m.

October 24.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Chairman's Day, including visit to new showrooms and offices of the Huddersfield/Halifax Group and a tour of Hopkinsons, Ltd.

October 25.—NORTHERN JUNIORS: Visit to Redheugh gasworks—Gateshead-on-Tyne.

October 25.—LONDON AND SOUTHERN JUNIORS: Visit to Shell Haven refinery and Romford works of the North Thames Gas Board.

October 28. — INCORPORATED PLANT ENGINEERS (SOUTH WALES BRANCH): Park Place, Cardiff. 'The Clean Air Act and Effluents,' by A. S. Minton. 7.30 p.m.

October 28.—EASTERN JUNIORS: Dorothy Restaurant, Sidney Street, Cambridge. Meeting includes a talk by A. R. Bovington on his experiences at the summer school of the Institute of Gas Technology, Chicago. 2.30 p.m.

October 28.—WALES & MON. JUNIORS (SOUTH WALES SECTION): Llanelly. Paper by Mr. P. C. Forbes, Deputy Engineer and Manager, Swansea undertaking.

October 29.—WALES AND MONMOUTHSHIRE SECTION, I.G.E.: Cardiff. Annual General Meeting.

October 30.—NORTH THAMES G.C.C.: Westminster City Hall, Charing Cross Road, W.C.2.

October 31.—MIDLAND SECTION, I.G.E.: Midland Tar Distillers' works, Four Ashes. Autumn meeting, including paper on 'Clean Air and Clean Water,' by E. T. Pickering.

October 31.—JUNIOR INSTITUTION OF ENGINEERS: Pepys House, 14, Rochester Row, Westminster, S.W.1. Informal meeting, including paper on 'Gas Cleaning in Practice,' by Dr. W. T. Cosby, 7 p.m.

November 4.—LONDON AND SOUTHERN JUNIORS: Afternoon tour of gas central heating installation and kitchens at Marks & Spencer Ltd., Baker Street and Hannah House.

British and German firms make agreement

A LONG-TERM agreement made by Newton Chambers & Co., Ltd., of Thorncliffe, near Sheffield, with Gottfried Bischoff, K.G., of Essen, Germany, is of considerable importance and interest to the British gas, chemical, steel and other industries.

Newton Chambers are undertaking the sale, manufacture and installation of the whole of the Bischoff range of plants within the United Kingdom and Eire.

This is of special significance at a time when British gas boards are changing from the conventional methods of gas-making. In order to reduce both production and capital costs and to make cheaper gas, they are introducing total gasification methods which require high-pressure gas purification plants and new types of by-product plant.

The Essen Company of Bischoff have constructed some 60 such plants in Western Europe and other countries, including Australia, and a plant designed by them is at present under construction in Korea. The agreement with Newton Chambers means that the benefit of the German experience in recent years is available to the British gas industry at the beginning of its latest developments.

Bischoff have a high reputation for many other types of plant, all covered by the agreement with Newton Chambers. For the last 40 years they have been leading designers in Germany and Western Europe of gas-cleaning plant for blast furnaces and producer gas. Most of the plants of this kind in the Ruhr are of their design.

They also make a wide range of by-product and chemical plant, including organic sulphur and naphthalene removal plants, gas scrubbers, nitric oxide elimination plants and gas drying and processing plants.

Other Bischoff equipment that will be available to British industries, through Newton Chambers, includes distillation plant, solvent recovery plant, and a complete range of water cooling towers. The agreement with Bischoff will enable the Company to extend considerably their range of plant to meet the growing requirements of the gas, chemical and other industries.

The policy of making available to British industries the proved engineering products of other countries is not new for Newton Chambers. In the past year they have entered into agreements with a United States company for the manufacture of equipment for industrial heating at elevated temperatures, with a Swedish firm for a new radiant heat type of recuperator, and a Dutch manufacturer for a coke-fired boiler of special design widely used on the Continent for central heating purposes.

Typical German installation by Bischoffs.

DANISH BOTTLED GAS FOR GUERNSEY

THE Guernsey Gas Light Company Ltd., have formed a subsidiary company to distribute and market the Danish bottled-gas Kosangas in the island.

The distribution of gas in this form will bring the advantages of gas for cooking, water- or space-heating within the reach of a large number of people in the outlying parts of the island who are not connected with the mains supply.

The cost of the new gas, which derives from refinery tail gases, should be 5% lower than any comparable type of bottled-gas, but the company aim to reduce the price still further by building their own storage and bottling plant in the island.

The gas will be usable on the whole range of the company's appliances.

The parent Danish company with which the new Guensey company will be closely associated has a quarter of a million customers for its products in Denmark. It has bottling plants in Northern Ireland, Eire, Crete, Cyprus, Beirut, Lebanon, Aden, Ceylon and India.

The gas is bought directly from France, Germany, Great Britain, Eire, South America and Aden.

Industrialists' plea rejected

SOUTH Eastern Gas Consultative Council has been advised by its *ad hoc* committee not to ask the area Board to reconsider its industrial tariffs structure with a view of making it fairer to smaller consumers.

A report circulated at the Council's last meeting says that Surrey Oil Refineries Ltd., and other industrial firms using limited amounts of gas, requested parity with large domestic consumers under a tariff introduced last summer.

The *ad hoc* committee said the Gas Board had stated they were not losing industrial consumers where gas was the appropriate fuel; they were getting their share of new loads.

If the request were complied with all industrial users would be having a large price reduction which would have to be paid for by an increase in the standard rate.

The committee felt it would be right, however, to ask the Board to give further consideration to their tariff to see whether it might be made promotional for some types of industrial small consumer.

EVESHAM . . . . . PENZANCE

South Western Grid Completed

A CEREMONY which took place on the outskirts of the Devonshire village of Harberton, near Totnes, last Thursday, will affect an area of 8,400 square miles in the South West, and a population of 3 mill. people. This was the final linking up in a bulk supply main which completes the South Western Gas Board's gas grid system between Evesham in Worcestershire and Penzance in Cornwall —an integrated supply system of 295 miles of main. (Editorial comment on p. 158.)

The final linking up ceremony was carried out at Hazard Farm, by Sir Harold Smith, Chairman of the Gas Council. The company included the Chairman of the South Western Gas Board, Mr. C. H. Chester, C.B.E., Board Members and chief officers, representatives of local authorities, and of trade, industry and commerce in the Cornwall and South Devon area.

Speaking at the lunch which followed the ceremony, Mr. Chester referred to what he called 'a triple first.' In the first place theirs was the first Board to be financially self-supporting and they expected to be in this position for at least the next two years or so. They would not require to borrow any additional sums of money for capital purposes and they might in fact be in a position to repay some of the loans which they had received from the Treasury and other sources.

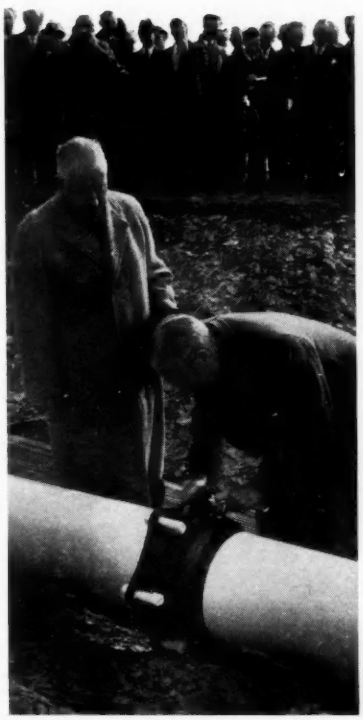
Reducing Inflationary Pressure

'So far as we know we are the first autonomous nationalised body to be in this position,' said Mr. Chester, 'and from a national point of view the effect of our not borrowing new money will be to reduce the inflationary pressure on the country, and to make more funds available for investment in other industries.' The effect from the Board's point of view of not borrowing would be to keep down interest charges as set off against rising costs of materials and labour and, probably equally important, to allow rather more freedom of action in the deployment of its large funds.

The whole of the works had been planned and executed under their own staff. Over £27 mill. pounds worth of work had been so designed and executed and over £8¾ mill. of this has been provided from internal resources. While on revenue account they had but a very small balance, the expenditure on capital for the provision of new up-to-date gasworks and this complete integration was now a saving in excess of £1 mill. per annum, rather more than 2d. a therm after charging for the interest, depreciation and obsolescence on the new plant instead of the old.

Mr. Chester continued: 'We are saving more than 120,000 tons of coal, costing more than £6 a ton; we are making 25,000 tons more coke; 50,000 tons more breeze; and 3½ mill. gal. more tar from our more efficient carbonising plant which has taken the place of 80 old and inefficient works now closed down. Only 1% of our total output is now supplied from inefficient and small units.'

Referring to other material savings and improvements, he said they require 34% less men to manufacture the gas and with central control now in operation for all production and distribution, in a separate control room at Bath, they were able to announce that the total establishment of the Board was today 21% less than in 1950. They claimed this as an achievement in increased productivity, and a proper employment of new capital.



Mr. C. H. Chester, South Western Board Chairman, watches Sir Harold Smith turn the last bolt.

'We are the first Board with this very extensive rural and not too profitable area to complete its integration,' he went on, 'and although its capacity is obviously not as large as that in the industrial area of London, the Midlands and the North, it is the longest and probably the most difficult to make profitable and to operate, but it has been done. This is the second "first." Gas is now of uniform steady quality throughout the whole area. The third "first" will have equally far-reaching results. As a result of concentration of manufacture and complete integration and the capital position, my Board is now able to announce that plans have been completed to install complete sulphur removing plant at the major works, and within about three years this work will be complete, so giving a pure gas throughout this extensive area, roughly equivalent to a distance between London and Newcastle—270 miles. We shall be the first Gas Board to achieve this sulphur-free gas.'

Another New Development

Mr. Chester said his Board was involved in another new development using a by-product of oil in the existing gas-making machinery. With this and other facilities now at hand they should be able to increase, without limit, any demand for a good, clean gas; and for a smokeless fuel from all their modern coke-producing units, sulphur free and at a price which would enable the full implementation of the Clean Air Act to become a realistic fact within a short space of time.

Referring to achievements in improved administration, Mr. Chester said that electronic accountancy, now centralised in Bath, would be complete in a matter of 12 months. In spite of the large increase in turnover between vesting date and today, amounting to many millions of pounds, their total establishment was expected to be not more than 6,440 by the end of 1959, compared with 8,800 in 1950.

Mr. Chester was proposing the toast of 'The Guests,' to which Alderman G. J. Wingett, J.P., the Mayor of Plymouth, responded.

Replying to the toast of 'The Gas Industry,' proposed by Councillor Miss E. M. Pearce-Gould, J.P., Sir Harold Smith spoke of the new industry which had begun to develop during the last four or five years. Seven or eight years ago he and his colleagues had begun to wonder where the industry would go. They had depended on good quality coal, the price of which had risen more than their consumers could afford to pay. They had therefore embarked on new schemes. As a result of research work which was still in progress, they were going to make gas from oil and oil products, from small, dirty coal; they were taking methane from the mines and flared gas from the refineries, and their latest venture was the importation of liquefied natural gas. As they wanted the whole country to have the advantage of these new methods, they were planning a national grid. Today they had seen the last stage of the grid in the South Western area—a wonderful achievement. In due course consumers would benefit from this and the other developments going on in the area.

Eastern Juniors visit Sigma Instrument Co., Ltd.

THE Eastern Juniors recently visited the Letchworth works of the Sigma Instrument Co., Ltd. They were welcomed by Mr. F. Boosey, Managing Director.

Replying, Mr. W. F. Pritchard, President of the Association, recalled the founding of the firm by Dr. A. J. Stewart in 1920. The gas industry, he said, was more than ever concerned with uniformity. With accurate measurement of fundamental gas characteristics and their control, many problems facing the industrial use of gas could be solved.

During their tour of the factory, the visitors saw the latest types of recording calorimeters, Wobbe Index recorders and portable pressure-vacuum recorders in the gas measurement section. In this section, too, the visitors were shown telemetering apparatus capable of transmitting information up to two miles and a testing booth in which recorders could be tested under conditions of pressure above or below atmospheric.

Of interest was the Sigma standard water flow calorimeter which is small enough to be stowed in a special portable box. Its most unusual feature is the provision of a 1/10 cu.ft. gasholder in place of the more usual laboratory meter. A special slide rule for calculating gas volume factors and Wobbe Numbers from more easily measured data was also on view.

Pictured during the visit of the Eastern Junior Gas Association to the Sigma Instrument Co., Ltd., are, left to right, Mr. L. A. Hedges, Manager, gas division, Sigma Instrument Co., Ltd.; Mr. W. F. Pritchard, President, Eastern Junior Gas Association; Mr. F. Boosey, Managing Director, Sigma Instrument Co., Ltd.; Mr. D. G. Simpson, Junior Vice-President; and Mr. V. A. Bignell, Hon. Secretary, Eastern Junior Gas Association.

The factory includes a modern machine shop, gas carburising, cyanide hardening and enamel stoving shops, as well as assembly shops for the comparator measuring instruments. These instruments can rapidly test the dimensions of precision engineering products such as gas-turbine blades, crankshafts, miniature rollers for roller bearings, and even carbon blocks for nuclear reactors.

Later, the Association was entertained to lunch at the Ickniel Hall, Letchworth, after which a paper on 'Automatic Control of the Properties of Town Gas' was given by Mr. K. A. Steele, of George Kent, Ltd.

A picture taken on the South Eastern Gas Board's stand at a clean air exhibition held in Camberwell, London. Mr. C. S. E. Roskilly, District Manager, Old Kent Road (right), is standing with the Mayor and Mayoress of Camberwell, Mr. and Mrs. F. A. Goldwin.

Tender invited

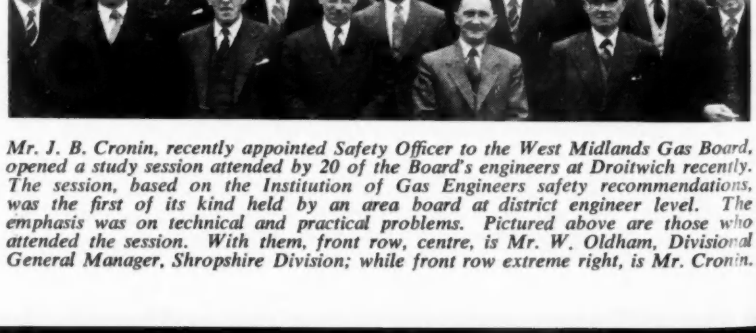
Coleraine Borough Council have decided to invite tenders for the supply and erection of a new gasholder, expected to cost £45,000. Installation of the holder will not be undertaken until 1961—the estimated delivery date.

Challenge of change

Whatever the immediate future holds for British industry and commerce, there is always the challenge of change to be met. The British Institute of Management has, therefore, chosen 'The Challenge of Change' for the theme of the B.I.M. National Conference being held this year in Brighton from November 26 to 28.

Talk by Chairman

Latest developments in the gas industry were the theme of a talk to members of the Wales Gas Consultative Council at a recent meeting in Cardiff by the Chairman of the Gas Council, Sir Harold Smith.



Mr. J. B. Cronin, recently appointed Safety Officer to the West Midlands Gas Board, opened a study session attended by 20 of the Board's engineers at Droitwich recently. The session, based on the Institution of Gas Engineers safety recommendations, was the first of its kind held by an area board at district engineer level. The emphasis was on technical and practical problems. Pictured above are those who attended the session. With them, front row, centre, is Mr. W. Oldham, Divisional General Manager, Shropshire Division; while front row extreme right, is Mr. Cronin.

The last in our series of special reviews of the sessions at the World Power Conference, Montreal

Industrial and Commercial Utilisation of Energy

THE session dealing with 'Industrial and Commercial Utilisation of Energy' was probably the least successful of those comprising the Canadian Sectional Meeting of the World Power Conference at Montreal. The fault lay not so much in the papers as in a generally untidy meeting with a poor discussion which tended to be sidetracked into issues of very local importance. A further disadvantage was the exclusion from this session of an important paper by Dr. W. A. Macfarlane, of the National Industrial Fuel Efficiency Service, which was essentially a utilisation paper but which for some reason was included in a different section of the programme. We shall therefore refer to Dr. Macfarlane's paper later in this review.

As has been previously explained, each section of the conference programme, comprising a substantial group of papers, was summarised by a General Reporter. Like his colleagues, Mr. John Davis, Director of Research and Planning, British Columbia Electric Company, Canada, who was responsible for this particular section, carried out his difficult task with conspicuous success. Much of this report is based on his remarks. In this connection we would point out that the scope of this article extends far beyond the utilisation limits of gas; this was after all a conference of fuel and power engineers from all over the world, embracing almost every form of energy, and to deal with one aspect would be to show a picture out of focus.

In the General Reporter's view the utilisation of energy has received less attention in technical literature than its production, and he pointed out that it is demand, perhaps even more than supply, which has provided the real dynamic influence for development in industry. If a ready supply of energy could itself help to stimulate expansion, its beneficial effects were not confined to the primary processing and intermediate stages of manufacturing. Secondary activities, including the trades and services, were also influenced by the quality, price and efficiency with which the various fuels and electricity could be put to work. So much so that some economists regarded the usage of energy in any particular country or region as a fairly precise measure of its progress and material well-being.

Effective demand, said Dr. Davis, could be shown to be a function of many things—of cost, quality, assurance of supply and the ability to execute new developments. Price, the variety and nature of the energy supplied and the requisite capital to ensure its prompt delivery were also relevant considerations. The character and stage of growth of the user industry must be taken into account. So must the changing efficiencies with which this energy was being applied to the various tasks which it was being called upon to perform. Technical information and the requisite skills without which many of these activities were impossible must also be there. Each of these conditions was, therefore, helping to modify, in one way or another, the significant relationship which appeared to exist between energy consumption, industrial productivity, personal income and national economic growth.

Most of the papers referred, in one way or another, to the cost of energy and its effect upon a particular industry or group of industries. One of the Canadian authors wrote that 'total expenditure on fuel and power as a percentage of gross national product, ranges anywhere from 6% to 12%, depending upon the year and the country involved.' Direct purchases might be as low as 1% or as high as 50% of the value which they added to their bought-in material. In respect of primary manufacturing these outlays were usually upwards of 10%. Energy, as a cost item in secondary manufacturing, averaged out at around 3% in North America. In the case of thermal power it might be as high as 60%. Thus a movement either way in the price of energy often had an appreciable effect upon the monies available for the purchase of other goods and services. But Dr. Davis noted that price discrepancies between one part of the world and another were narrowing, and he instanced the expanded use of oil as having helped to average out geographical differences.

The level of energy costs was still a deciding factor in respect of some of the primary and resource-processing industries which used energy most extensively. The occasional one, as the real price of fuel or power continued to go down, would choose to locate close to the market rather than to the principal source of energy. Others, such as the manufacture of pig iron, steel, uranium, aluminium, magnesium, titanium, abrasives, and some of the bulkier electro-chemicals were bound to benefit from such further improvements as were made on the cost side. On balance, and with the prospects of technology adding to the number of materials requiring large amounts of energy in their initial treatment, one would expect the number of these industries to grow rather than diminish.

Turning to the influence of quality on the nature and location of certain industries. Dr. Davis pointed out

that coal, even the higher priced varieties, was among the least transportable of our several forms of energy. A number of industries, particularly steel and the other metallurgical types, were therefore drawn to a comparatively few regions where the better grades of coking fuel existed. In some ways, natural gas was also unique. It was ideal for the production of ammonia, acetylene, and certain other organic chemicals. Gas manufactured from coal could also be used advantageously in the production of ceramics, high quality steel and other metals and in food processing where cleanliness and ease of control were paramount considerations. Also, in lending itself more readily to automation than coal or the heavier fuel oils, gas, however produced, could effect savings in direct labour costs and in the amount of plant required per unit of output. The gaseous fuels were therefore winning out in industries favouring the installation of continuous production lines and processes.

Here Dr. Davis referred to the excellent paper by S. G. Aberdein, Commercial Manager, and A. E. Tyrrell, Deputy Divisional Manager, H.Q. Division, North Thames Gas Board. In this paper (published in our 'Gas In Industry' Supplement on October 1) the authors analyse 'Recent Trends in the Industrial Utilisation of Gas and a Pattern of Probable Future Expansion,' and, like their fellow authors from the British gas industry, J. E. Davis and C. Ryder, very properly take the opportunity of showing just where the industry stands today and how it may be expected to develop in future years. In this paper they discuss the movement of industry towards increased automatic processing and the probable effect upon the fuel-providing industries; examples are given of the integration of thermal power into continuous production lines and new developments in the heat treatment of metals and in the ceramic and catering industries.

Oil Firing Results

What Aberdein and Tyrrell did for gas at the conference, T. C. Bailey and H. J. Pressy, respectively Sales Manager, Industrial Fuel, and Fuel Oil Manager, Shell-Mex and B.P. Ltd., did for oil. They explained that, as a result of oil firing, the output of a number of metallurgical plants had increased by as much as 30% and furnace maintenance had been reduced. It was claimed that these results had been brought about by the controllability, high-temperature luminous flame, and the high heat availability of petroleum and its products. Smaller furnaces treating non-ferrous metals had had their capacity increased by as much as 100%, following conversion from coke to oil. The liquid fuels also appeared to be preferred in the brick and refractory making industries as reductions in firing cycles had both increased the capacity of existing plants and had reduced the amount of energy required per unit of output.

Oil is a serious competitor of ours in a number of industrial processes today and this most interesting paper gave an excellent picture of what oil can do—or claims it can do—and how it is expanding and is likely to continue to expand. The authors summarised the case for oil as follows:

'It is submitted that the characteristics of oil can contribute to high productivity in many manufacturing processes. The characteristics of oil that influence greater productivity are defined as: (a) Ease of delivery, (b) convenience in storage, (c) ease of handling, (d) uniformity of quality, (e) controllability and flexibility, (f) high flame temperature, (g) luminous flame, (h) high heat availability,' and the reasons why they do so were explained, supported by some technical data where necessary. They envisaged 'a steady and continuing large-scale expansion' of their industry.

Sometimes an Ally

But if in some of its uses oil is in competition with gas, in others it is an ally. Messrs. Bailey and Pressey devoted a section of their paper to the manufacture of town gas. We quote: 'Petroleum distillates have long been used by the gas industry in carburetted water gas plants to maintain the declared calorific value of the town gas and to increase production to meet peak demands. Today the British gas industry is looking to oil, not only to meet fluctuating peak demands but also to provide a portion of the increased town gas production necessary for our expanding economy. It must be made clear that in the authors' opinion coal will for many years remain the basic raw material for the manufacture of town gas in Great Britain and that oil should be regarded as a complementary raw material which will help to meet the demands of greater national productivity. Since the last war new gas-making processes have been developed which can utilise the heavier residual grades of oil-fuel. . . . While existing plants produce gas at relatively low pressures, processes are now in the course of development which will produce gas at pressures in excess of 30 atmospheres.'

While on the subject of developments arising from the oil industry reference should be made to an interesting contribution from Russia. This dealt with improvements in efficiency in the utilisation of fuel by the oil industry in the U.S.S.R. Less crude oil, for example, was used in the manufacture of petroleum products. The quality employed as a percentage of the total output of all oil refineries in the U.S.S.R. fell from 5.65% in 1950 to 5.25% in 1956. In high temperature cracking plants, the corresponding drop was from 11.32% down to 8.71%. In catalytic cracking units the figure dropped from 36.37% in 1952 to 26.77% in 1956. In pyrolysis plants the saving was reported to be from a 30.53% usage in 1950 to one of 23.80% in 1956.

Electrical Energy

As might be expected, several papers dealt with electricity and one, 'Electrical Energy in the Production of Metal,' made some interesting points. For example, the authors maintained that coal would probably continue to be the dominant energy factor in the reduction of iron, lead, nickel and zinc, while the availability of oil and natural gas would also continue to discourage the introduction of electricity into these processes. But for reactive metals, electricity remained essential to their separation.

From among the variety of papers a number of interesting facts emerged about utilisation trends in various countries. It is neither necessary nor possible to mention them all, but as an example we take a paper in which the economic and technical trends in metal-

lurgical steel processes were examined in the light of the particular needs of the Swedish steel industry. It appeared, as a result of these researches, that the sponge iron process which used coke and a source of hydrogen such as natural gas, oil refinery gas, or coke oven gas as its principal reducing agent probably used less energy than any other method of reducing iron ore. The sponge iron products could also be melted more efficiently in an electric furnace. However, for a large scale production the blast furnace could still compete with a sponge iron furnace, even in Sweden. This is because pig iron produced by the blast furnace method could be charged into steel furnaces as liquid metal. Also new oxygen steel processes had been developed during the last few years which could be used to facilitate the conversion of hot metal into steel.

Interesting Contribution

In view of this wealth of information it was unfortunate that the discussion which followed did not maintain the standard. Contributions came from Sweden, Switzerland, Cairo, Russia, France, Canada, the United States, and Great Britain. In the main, references to gas were confined to the natural variety: For example, the effect of bringing a 16-in. pipeline 217 miles in Pakistan to feed factories and assist the manufacture of fertiliser, and the result of natural gas in the Lacq district of France. We thought the most interesting contribution came from Mr. C. R. Cooper, Assistant Chief Commercial Officer of the South of Scotland Electricity Board, who described his Board's pricing policy and the way in which they filled in the valleys on their load curve.

Reference was made earlier to Dr. Macfarlane's paper. Entitled 'Fuel Efficiency in the United Kingdom and its Economic Advantages,' this gave three studies of the economic scope for improving fuel efficiency in general industry and made an estimate of the total potential for saving. The author summarised the capital expenditure required to save fuel in general industry as follows:—

	Coal savings tons/annum	Total capital cost £	Capital cost £/annual tons saved	Pay-off time years
Lancashire Boiler Tests ..	114,000	430,000	3·8	<1
Heat and Power Surveys ..	100,500	1,026,000	10·2	<3
Government Loan Schemes	78,063	1,022,636	13·1	<3

Earlier in his paper Dr. Macfarlane had devoted a section to the progress of fuel economy in the gas industry, prefaced by an interesting table.

Fuel efficiency in the gas industry, 1948-1957.

Year ended March 31	Production efficiency %	Average cost per ton of coal*	Average cost of gas per therm to consumer*
1948	71·0 (estimated)	—	—
1949/50	—	100	100
1950/51	—	103	104
1951/52	—	114	113
1952/53	74·8	125	125
1953/54	75·4	135	131
1954/55	75·7	141	132
1955/56	76·8	158	142
1956/57	77·8	173	154

* Reduced to index figure of 1949/50 equals 100.

Commenting on this, the author remarked that the process of manufacturing gas and coke from raw coal was one of refining chemical energy, unlike the conversion of chemical into electrical energy. Furthermore, the thermal efficiency of carbonising coal was long ago brought to such a high pitch, that there had been no scope in the last decade for proportional improvement such as had been achieved in power production. The results of the British gas industry's programme of modernisation and extension during the last decade were, nevertheless, impressive. The table showed that the product of the industry had not increased in price at the same rate as the fuels which were its principal raw materials, an achievement to which the improvement in fuel efficiency had made a substantial contribution. The quantity of coal saved by the gas industry over the period had been nearly 10 mill. tons valued at some £40 mill. The authorised capital expenditure of the industry during this period had been just under £400 mill. Apart from the introduction of new processes of gasification, the main scope for further increases in thermal efficiency appeared to lie in the improvement of steam-raising and ancillary equipment, said Dr. Macfarlane. The National Industrial Fuel Efficiency Service had been called upon by several area gas boards to carry out detailed surveys of such plant.

Coke Oven Gas

Finally in this section the author referred to the substantial contributions to the national energy economy that were represented by the gas industry's purchase from the steel industry and distribution of surplus oven gas, now amounting to 16% of the total gas available, and, more recently, of refinery gases from the oil industry.

A similar analysis of the electricity supply industry included a table showing the fuel efficiency of that industry which can with advantage be compared with the one published above.

Fuel efficiency in the electricity supply industry, 1947-1957.

Year ended March 31	Average thermal efficiency %	Coal saved tons	Average cost per ton of coal delivered*	Average price per unit to consumer*
1947/48 ..	20·91	—	100	100
1948/49 ..	21·22	392,000	105	104
1949/50 ..	21·45	722,000	104	106
1950/51 ..	21·69	1,157,000	107	104
1951/52 ..	22·19	1,980,000	119	107
1952/53 ..	22·73	2,887,000	125	115
1953/54 ..	23·37	4,090,000	132	120
1954/55 ..	23·83	5,336,000	137	120
1955/56 ..	23·35	6,710,000	151	123
1956/57 ..	24·93	8,167,000	164	128
	Total ..	31,441,000		

* Reduced to index figure of 1947/48 equals 100.

Dr. Macfarlane commented: 'The sharp rise in the price of coal in the United Kingdom during the last ten years must, therefore, have caused the gas and electricity industries grave concern. Fortunately, the rapid expansion of demand for energy has been met by programmes of new construction, or modernisation, in which plant of far higher efficiency than pre-war has been installed. This is one of the reasons why the prices of gas and electricity to the consumer have not increased as much as that of coal, thus improving the competitive position of the secondary supplies of energy.'

I.G.U. ROME—
'Gas Journal' Abstract

SESSION 3 B

Review of Technical Sessions

Continued from October 15, page 135

IGU/17-58 First Aid and Artificial Respiration—Training Programme and General Instructions.
Report by the Swedish Association.

IGU/10-58 Developments in Gas Measurement, particularly of Large Volumes of Gas at High Pressure.
Report by the Institution of Gas Engineers.

IGU/28-58 Use of Plastic Materials in Gas Meter and Regulator Diaphragms.
Paper by C. J. Sevey, Superintendent of Meter Repairs, Southern California Gas Company, and J. Stanford Setchell, Secretary, Operating Section, American Gas Association.

IGU/34-58 Civil Engineering in the Gas Industry—Recent Developments.
Paper by D. A. Andrews, M.I.C.E., M.Inst.Gas E., South Eastern Gas Board.

IGU/39-58 Research on the Production of Town Gas by Chemical Conversion of Hydrocarbons.
Paper by Prof. Carlo Padovani, Director, Fuel Experimental Station, Italy.

ARTIFICIAL RESPIRATION

THE Swedish Gas Association presented a report at the 6th International Conference in New York, 1955. It described different methods of artificial respiration and gave some general information about the treatment of casualties arising from accidents in gasworks. The report was drawn up in collaboration with the Swedish physicians, Drs. P. Strömbäck (Swedish Red Cross) and C. J. Clemedson (Swedish National Defence).

The Union decided that the Swedish Gas Association should be commissioned to present international recommendations on these subjects to the Conference in Rome this year. In collaboration, therefore, with the abovementioned physicians and Mr. G. Borger, Safety Engineer of the Stockholm Gasworks, the present report was drawn up.

After a general introduction, the report opens with syllabuses for two Training Courses in First Aid, one of five hours for all personnel, the other of 20 hours for 'leaders,' foremen, supervisors, etc. This is followed by General Instructions in First Aid which concludes with detailed descriptions, illustrated by photographs, of two methods of artificial respiration—the 'arm lift-back pressure' (Holger Nielsen) method and the Eve 'rocking' method in which the casualty is rocked on a stretcher pivoted at the centre of its length.

At the same time it is remarked, in the introduction, that 'resuscitation by oxygen or carbogen inhalator is naturally by far superior to any manual method.' The handling of such apparatus requires considerable skill. Training in this is not included in the recommendations but it is suggested that inhalators should be available and that all personnel should know where they are stored and how they work.

DISCUSSION

Mr. G. VAN ITERSON (Holland) recommended that the I.G.U. should draft a schedule for training and general instructions for international use.

Mr. W. HODKINSON (G.B.), putting forward the joint views of the medical officers of the British gas industry, said there were some important points which they could not accept.

Artificial Respiration and Oxygen

Artificial respiration was the *first* treatment in asphyxia. Oxygen was of secondary importance. Oxygen alone would not revive a man who was not breathing but would make him recover more quickly if artificial respiration were performed. It should therefore be stressed that the teaching of artificial respiration was the first line of defence in the treatment of asphyxia.

There were machines available to perform artificial respiration. These were good in the hands of intelligent, skilled people. They were not suitable for general use.

The use of carbon dioxide for resuscitation was condemned. It might help to ventilate the lungs of those slightly gassed; in those who were severely gassed it could kill. There was some doubt about the value of oxygen containing 5% carbon dioxide. In Britain, the gas industry medical officers favoured the use of pure oxygen.

It should, however, be stressed again that oxygen was only supplementary to artificial respiration as a means of resuscitation.

Paragraphs 2 and 3 on page 5 of the document should be amended accordingly.

Canister Respirators

The use of canister respirators for protection against carbon monoxide had been condemned by the British gas industry. They were dangerous because the chemical in the canister might deteriorate with storage. The canister might give protection for a shorter time than expected.

The simplest and safest method of protection was by face mask and air hose. For distances up to 60 ft., normal breathing could draw in air. For greater distances air could be delivered by pump. There were remarkably few places in a gasworks which could not be reached by an Antipoys or Bloman type of fresh air breathing tube and mask. For other situations compressed air from bottles carried on the back or delivered through a reducing valve from a compressor was the best means of air supply.

Self-contained oxygen sets had a limited use because they

needed specialised training which must be continued at frequent intervals.

The Eves Rocking Method

While this method was effective it required special apparatus. It was considered better therefore to concentrate on the efficient Holger Nielsen method and to teach everyone how to do it properly. It was suggested that the Eves method be omitted from the document.

Drafting Points

Before publication, the English translation should be revised. The wording in places was not quite right. It should be revised by one of the English speaking medical officers of the industry.

Mr. G. E. RASMUSSEN (Denmark) showed the card of printed instructions which was widely circulated in his country.

Mr. J. A. PRIGG (G.B.), speaking as a distribution engineer, said that gassing cases usually occurred out on the job. It was very important to ensure that no break in artificial respiration was caused by the patient's transfer by ambulance to hospital.

LARGE VOLUME MEASUREMENT

The second item on the agenda of this session was the report by the Institution of Gas Engineers on Development in Methods of Gas Measurement, particularly of large volumes at high pressures.

To enable information to be collated on a uniform basis a questionnaire (appended to the Report) was issued to member countries. The term 'large volumes' was interpreted as bulk supplies to undertakings and big industrial and commercial users. The two countries with the most information to offer were Germany—with a wide experience in the measurement of large volumes of gas over a number of years in the transmission and distribution of coke oven gas, especially in the Ruhr—and the U.S.A. where the use of natural gas has made spectacular progress during the last few years.

In Germany, where costs of production of gas are relatively high, there is more emphasis on accuracy of measurement, but in the U.S.A., where first cost is relatively low, inaccuracies are not so important and development has followed the line of the differential flow (orifice) meter, particularly as volumes and pressures are outside the range of ordinary displacement meters.

Natural gas is developing rapidly in other European countries and, though not on such a large scale as in the U.S.A., they are following the patterns of measurement in Germany and the U.S.A. In Great Britain, where the necessity to measure large volumes is comparatively infrequent, metering is generally carried out with the commercial meters available.

It is agreed that the most accurate measurement is obtained by the bellows-type displacement meter. Meters of this type with capacities up to 10,000 cu.ft. per hour (s.t.p.) at 250 lb. per sq. in. and 5,000 cu.ft. per hour at 500 lb. per sq. in., are available in the U.S.A. Rootes-Connersville meters are used at pressures up to 125 lb. per sq. in., and capacities up to 6½ mill. cu.ft. per hour are available in the U.S.A. and Germany.

Above the capacities of the displacement type of meter there is no alternative but the inferential type, generally using the thin diaphragm orifice and measuring rate of flow by means of pressure difference. In spite, however, of elaborate refinements these meters are not accepted by many authorities in the U.S.A. or Germany for the measurement of gas supplied to users.

DISCUSSION

Mr. R. J. S. THOMPSON (G.B., W. C. Holmes and Co., Ltd.), said the report, being a factual account of information obtained from users, did not call for any critical comment.

The B.M. Meter

In connection with the B.M. meter, the authors drew attention to the fact that oil must be removed from or added to the seal from time to time to keep the level correct. It should be noted that the form of the meter drum was such that variation in the level of oil, over a certain limited range, made no difference theoretically to the volume measured. However, in practice, variations in liquid level did make some difference.

In the modern forms of this meter, the level of oil (or other sealing medium) was kept constant by means of an internal storage compartment. If the volume of oil expanded it overflowed into the storage compartment. At the same time a small pump driven by the drum itself continually supplied oil from the storage tank to the seal, thus maintaining its level even when the total volume of oil was falling.

Rootes-Connersville

With regard to Rootes-Connersville meters, they could be used at almost any pressure by the simple device of enclosing low-pressure meters in high-pressure containers which could take any convenient form.

So far as volume correction was concerned, several manufacturers now supplied automatic devices for giving the meter reading corrected for pressure and temperature.

PROGRESS WITH PLASTICS IN METERS

Messrs. C. J. Sevey (S. California Gas Company) and J. S. Setchell (American Gas Association) report on the use of plastic materials in gas meter and regulator diaphragms.

Plastic materials have been used extensively in the U.S.A. for gas meter diaphragms with satisfactory results and tend to replace leather. Replies to a questionnaire indicate that other countries have either not used plastic diaphragms or have used them only on an experimental basis with varying results.

Data in the U.S.A. demonstrate that whereas there is significant 'proof change' with leathers during their service life there is virtually no such change with synthetic diaphragms over long service periods and that inconsistency with the same or different types of meters is eliminated by the use of plastic diaphragms. It is reported that synthetic diaphragms are being used in well over 50% of all new meters manufactured in the U.S.A. as well as for diaphragm replacements in meters removed from service on all types of gas.

DISCUSSION

This paper was introduced by Mr. CHESTER S. STACKPOLE in his usual breezy and arresting style.

Mr. L. W. ANDREW (G.B.) remarked that some countries of course had clean dry natural gas handed them on

a plate! He called attention to the fact that one country alone seemed to have such outstandingly satisfactory results, and careful investigation still seemed to be called for. In Great Britain results were so far not as satisfactory as with properly lubricated leather diaphragms. They found a tendency for plastic materials to suffer deformation near the points of attachment.

Further data would be welcome. At what gas rates were the American tests carried out? What types of leather and oil were specified?

Mr. STACKPOLE said that all enquiries addressed to the A.G.A., in New York, would be dealt with.

C. S. Stackpole (left) with H. E. Smoker and C. Schlegel, both of Philadelphia.

ITALIAN FUEL RESEARCH

Studies and research into the production of town gas by chemical conversion of hydrocarbons are described and discussed by the Director, Prof. Carlo Padovani.

His paper covers work on laboratory and pilot plant scales on the pyrolysis of natural gas, other rich gases and combustible oils, on the reforming of similar fuels with air, steam or both, in conditions exothermic or endothermic (both laboratory and pilot scale), and a pilot plant with regenerative interior heating for auto- or endothermic cyclic working. Details of the plants and apparatus are given, together with results.

Problems of interchangeability between these gases and natural and town gas are discussed. The importance of propane, whether reformed or mixed with air, in the European economy is stressed.

'In spite of the availability of growing quantities of natural gas and of refinery gases, and the tendency to develop processes for the production of rich gas from coal (methanisation of water gas, hydrogenation, gasification under pressure) gas with a medium calorific value (between 4,000 and 5,000 cal/m^3; 420 and 520 B.t.u. per cu.ft.) remains the basis of the European gas industry.'

Prof. Padovani concludes that the work of his station has demonstrated some of the numerous possibilities offered by modern techniques to use hydrocarbons (especially the light oils) as a primary material in the manufacture of town gas.

To T. V. Garrud (N.T.G.B.) it appears to be a stone-cold cert; V. O. Stanton (S.E.G.B.) is perhaps a little sceptical.

TRENDS IN STRUCTURAL ENGINEERING

Mr. D. A. Andrews of the South Eastern Gas Board surveys recent developments (with numerous well-illustrated examples) of civil engineering in the gas industry in Great Britain. Concentration of gas manufacture in large units has presented problems of heavy structures and foundations which have been designed in keeping with modern trends, while corrosion due to the nature of the materials of manufacture as well as atmospheric pollution has led to an increasing use of concrete, often pre-stressed, in their construction.

Rule-of-thumb assessments of soil resistance have given way to geotechnical investigation—the use of preliminary boring—although this still involves experience in interpreting the data thus obtained. Cast-in-situ piles, of which several systems are available, are proving more economical than the pre-cast pile. Heavier compressing machinery necessitates a study of the resonance frequency of the surrounding ground in relation to the unbalanced vibrations of the machine.

Where the use of steel is inevitable, design can avoid corrosion pockets, while the pre-treatment of the metal by such processes as phosphoric acid pickling can extend the durability of paint and thus reduce overall cost.

Recent examples of civil engineering construction are described in considerable detail. They range from riverside structures to gasholder tanks, storage tanks, bridges and supports for pipes, to structures of a more general nature.

DISCUSSION

There was a disappointing lack of runners for the discussion, but Mr. W. R. GARRETT (G.B.) stepped into the breach to stress the advantages of pickling structural steelwork. It had been started by the old South Metropolitan Gas Company when he was with them in 1935. He was convinced it was the right thing for gasholder plates; in the Northern Board there was a case of a holder that had gone for nine years and had perhaps two years still to go without a second painting.

Referring to soil conditions, Mr. Garrett said that in his area Holmpress piling had proved very suitable.

The final instalment of our review of the proceedings of the ten Technical Sessions will appear next week. In our preparation of this material we are greatly indebted to the collaboration of Mr. C. D. SHANN, M.A., M.INST.GAS E., Manager of the Overseas Gas Division of William Press and Son, Ltd.

I.G.U. ROME—
'Gas Journal' Abstract

SESSION 4 A

IGU/12-58 Investigation on Unconventional Flues.
Report by the Institution of Gas Engineers.

IGU/7-58 Modern Methods in the Physical and Chemical Processing of Gas in Coking Plants.
Report by the French Association.

IGU/20-58 Supply of Gas to the City of Hamburg—by Coal Gas, Refinery Tail Gases, Natural Gas, combined with Underground Storage.
Paper by Direktor Dipl.-Ing. G. Düwel, Hamburger Gaswerke, Germany.

IGU/18-58 Putting into Operation Spherical Gasholders and some Technical Properties of Gaseous Flows.
Paper by Prof. Dr. Fritz Schuster, Gaswärme-Institut, Essen, Germany.

IGU/46-58 Fuel Gasification and Gas Conversion—A new method for the calculation of gaseous equilibrium and reaction temperatures.
Paper by H. Deringer, Directeur du Service du Gaz et des Eaux, Winterthur, Switzerland.

PROGRESS TOWARDS SHARED FLUES

THIS survey by the Institution of Gas Engineers of experience and practice with unconventional flue systems was based on reports from twelve countries. Three types are investigated—the simple common flue, the branched or shunt flue system, the common duct for use with appliances with room-sealed combustion chambers. The investigations relate mainly to the requirements of modern housing new construction in which the multi-storied building predominates. The provision of individual flues running up through the building from the appliance to the roof is often regarded as uneconomic. Since wall terminations are often forbidden by the relevant regulations, or avoided on aesthetic grounds, the use of a common flue to vent a number of appliances is an attractive proposition.

Regulations are summarised governing the use of shared flues in the several countries. Details of experience, typical installations and design data are given for the three types of flue.

Shunt System

Many thousands of flats in France, Belgium and Holland are served by branched flues on the shunt system with complete success. Common ducts for appliances with room-sealed combustion chambers (those in which air for combustion is taken from a point outside the room in which the appliance is fitted, involving the balanced flue principle) have recently been the subject of much experimental and theoretical work in Great Britain. Only one installation, outside the laboratory, is under construction, though several more are projected. The system 'offers perhaps the safest and most economic method of venting gas equipment in tall buildings.'

Further Work Required

Performance and experiences with shared flues are compared with those with individual flues, with a report on the economic aspects.

It is suggested that future work is required (experimental and theoretical) on the limitations of simple common and branch flues to find out the maximum number of appliances and dwellings which may be connected to the main flue; and the relative performance of branched and simple common flues should be considered with a view to determining the importance of the branch. Practical evidence should be obtained with installations of shared flues for room-sealed appliances, and the practical ventilation characteristics of appliances connected to branched and simple common flues should be investigated.

The report is illustrated by diagrams of the several types of flue systems with which it deals.

DISCUSSION

Mr. A. R. BENNETT (G.B., Radiation Ltd.) said:—It is very encouraging to designers and makers of gas appliances to note the attention now being given by gas authorities to the problems of disposal of products of combustion from gas appliances in modern designs of buildings. The domestic use of gas has undoubtedly suffered in recent years from insistence on conventional fluing of appliances; and while from a safety aspect the policy of living with the devil we know has much to commend it, it can also restrict progress and cause added expense which in the end defeats the main object, namely that of encouraging the use of gas wherever appropriate and economic.

Repercussions on Appliance Design

The more one studies the problems of fluing of gas appliances, the more obvious it becomes that the flue and the appliance should be treated as a single system if the best results are to be obtained. Little has been said in the present paper regarding the repercussions on appliance design of shared flue installations. In many cases, of course, conventional appliances can be used on such flues with complete success, and indeed with better control of room ventilation than is often achieved with conventional separate flue installations.

It is when one considers appliances with room-sealed combustion chambers that the interaction of appliance design and flue design becomes of great importance; and my main objective in speaking today is to point out the danger of adding unduly to the numerous limitations imposed on appliance design, particularly in connection with combustion and safety requirements, if the attempt is made to push the shared flue principle too far. Some types of appliance can without difficulty be designed to tolerate operation in atmospheres vitiated by products of combustion from other appliances and without material sacrifice of other desirable characteristics.

Shift from the Optimum?

In other cases, however, and particularly where close contact between flames and solid material is desirable, tolerance of vitiated atmosphere can only be achieved at the expense of reduced efficiency or increased complexity and cost. Almost inevitably, the wide margins already required to meet gas quality variations need to be widened still further, and in general one moves further from optimum conditions of operation. Just as in the case of gas quality, where the economics of gas manufacture have to be balanced against the limitations of utilisation of a variable commodity, so in the design of shared flues—the savings on the flue construction have to be considered in relation to the added restriction or complexity in the design of the appliance itself. Unfortunately very little is yet known of the economics of shared flue construction, and the most urgent need is for the widest possible accumulation of data on this aspect.

DISCUSSION

Mr. TINBERGEN (Holland) said that in the Netherlands building surveyors took the view that the fireplace in a room should be suited to any kind of fuel and not only for use with gas. Did this apply in England?

Mr. G. H. FUIDGE (G.B.) said that for gas appliances correctly designed flues could be quite small; 20 sq. in. cross-sectional area was usually ample for domestic appliances, and when constructed in cement asbestos or as precast multi-channel blocks, they could achieve a considerable reduction in cost and size compared with the older conventional flues. There were many cases where individual flues for gas appliances were as cheap and convenient as shared flues. Although much fundamental work had been carried out on the operation of individual flues, an extension was required to determine the optimum area of flues of various heights intended specifically for gas appliances.

Se-Duct Progress

Many of the problems of the disposal of products of combustion were solved by the balanced flue principle. It was to overcome some of the limitations of the balanced flue appliances in tall buildings, particularly the need to fit them on external walls, that his board developed the simple ventilating flue called the Se-Duct. Altogether some 40 schemes were on the drawing board and five or more separate systems were under construction. He had hoped to be able to report on the practical performance, but the first block of 160 flats containing 16 Se-Ducts, although nearly completed, was not yet occupied by tenants. One duct in this installation was fully instrumented to obtain complete data on the air flow in the vertical duct and in each of the horizontal ducts, the pattern of usage of the appliances and the CO_2 content of the air and products mixture at the top of the duct.

All appliances intended for use on the Se-Duct, and these included a range of instantaneous and circulating water heaters, natural convection heaters and warmed air heaters, had been tested with vitiated air; and it had been found in all cases that there was no reduction in combustion efficiency with a CO_2 content of the air of at least $2\frac{1}{2}\%$. Very few appliances were even affected by 3% and they were not extinguished by as high as 8% CO_2. The danger of extinction of an appliance through smothering was thus very remote, and this fully justified the decision to assume a usage factor of only 30% for instantaneous water heaters.

Attention had been drawn in the report to the possible constructional difficulties in providing a base duct running through a building to opposite sides. Although his colleagues White and Carne had fully investigated the performance of the duct itself, there was a dearth of information on wind pressures around buildings, and they therefore considered it advisable to have two inlets, preferably on opposite sides of the building. As a result of practical experience they hoped to simplify this feature of the system and in many cases to eliminate one of the inlets.

Power Evacuation

A factor which must dominate in flue systems was the available motive power for evacuation of the products of combustion. The motive power naturally available was small. It would seem that an approach to the problem of evacuation of the products of combustion assisted by extraneous power was well worthy of investigation. Considerable simplification and reduction in size of flues would be possible.

M. COUDEVILLE (France) considered that the regulations in the various countries were not logical, and should be reviewed in the light of practical experience.

Mr. ANDREW, replying to Mr. Bennett, agreed that one should look at testing methods from time to time if conditions changed, as the standards were meant to be realistic and based on practical experience. It was necessary to remember, however, that appliances in a Se-Duct had of necessity to work in a vitiated atmosphere, and as far as unconventional flues were concerned there was still a lack of practical experience, using appliances. It would, for example, be quite wrong in the present stage of experience to have inter-connected flues if there were no flame failure devices fitted to the appliances. It seemed important to start cautiously, proceed rapidly, and then review the position.

Answering Mr. Tinbergen—as far as the U.K. was concerned, it was not a regulation that a flue should be capable of burning any fuel. In the past, flues had normally been capable of burning solid fuel, but in modern blocks of flats it was often impracticable to use solid fuel. In these circumstances, it was clearly desirable and more economical to design a flue of the right size to burn gas and gas only. It was hoped this attitude would extend to some flues other than those in flats, as it would be a serious restriction to provide flues suitable for solid fuel if conditions were such that gas could be used economically.

Mr. Andrew agreed with Mr. Fuidge that there were potentialities in forced draught extraction and, in point of fact, this was one of the items of research being actively pursued at Watson House.

Illogical Regulations

He also agreed entirely with M. Coudeville that the regulations were completely illogical; but in most countries the authorities were aware of this and a great number of installations were put in which were not theoretically admissible. It had also been proved in many cases that a waiver of regulations could be obtained if a satisfactory technical case could be put forward and, if necessary, some form of guarantee given. It was believed that regulations would come into line with good practice as soon as any new installations had been shown to represent good practice.

Mr. Andrew in his final summing-up made two pleas. The first, that member countries should make available practical experience on unconventional flues as and when any data were obtained. This particularly referred to practical experience of performance, and also to savings in capital and installation costs. He was willing to correlate this information as it came along and not wait for any formal review. The second plea was to the I.G.U. Council—that the Review of Unconventional Flues should be brought up-to-date at the next meeting of the I.G.U. in three years' time.

MODERN PROCESSING IN COKE PLANTS

The A.T.G. de France submits a survey of modern methods for the treatment of crude gas from coke ovens. Some 32 instances are described more or less in detail in schedule form with three illustrated by schematic lay-outs.

Beginning with the hydraulic main, some of the most recent plants practice the re-circulation of liquor. Condensers are generally used in two stages, sometimes with the primary before the secondary after the exhausters, sometimes with both before. Generally exhausters are of the centrifugal type. Detarring is almost universally effected by the electrostatic precipitator placed after the secondary condenser. When it is placed after the exhausters some operators note an absence of tar, this having been removed by the exhausters; and this absence of tar may lead to naphthalene blockages if the temperature after the secondary condensers is too low. In two cases detarring is effected mechanically before the exhausters by extractors of the P. & A. type, while in one case tar is removed at several points in the train. Naphthalene washing is always done with tar oils or petroleum oils.

Two methods of ammonia washing are used; one producing liquor for subsequent treatment, the other using acid for the direct production of sulphate. In the construction of plant of the latter type, metals other than lead, Monel, acid-resisting steels, have been used.

Sulphuretted hydrogen is removed by liquid processes with or without the subsequent use of oxide. One plant uses the Otto-States-Mines process resulting in the production of elemental sulphur.

Purification under Pressure

One instance is given of purification under pressure. After condenser, detarrer, exhauster and ammonia washer the gas is compressed to about 9 atmospheres after which it is cooled, treated for the elimination of NO, cooled, washed the first time for naphthalene, cooled, washed for benzole, purified from H_2S in sodium carbonate followed by oxide, cooled and finally washed again for naphthalene.

DISCUSSION

Mr. G. DOUGILL (G.B.) had read the report with very great interest particularly as he was the co-author of a paper on a similar subject. To have the general lay-out of most of the gas purification systems in Europe was extremely valuable. They would expect to require a very different system of condensers, washers and other plant when dealing with the gas from ovens designed to produce the maximum weight of coke from (say) a low volatile German coking coal, compared with similar plant to deal with gas from ovens designed to produce the maximum number of gaseous therms from a high volatile English coking coal. In the latter case, the cracking conditions in the top of the oven were necessarily arranged to be more severe and therefore produce more naphthalene and a thicker tar, and required a more elaborate system of ancillary plant.

He therefore suggested that the report would be greatly increased in value if some indication could be given of (a) type of oven; (b) type of coal used; (c) coking time; and (d) flue temperatures for each unit of plant recorded.

Mr. K. W. FRANCOMBE (G.B., Whessoe Ltd.) said it was worth studying this paper in conjunction with that presented by Dougill and Spivey (IGU/33-58). Different ideas were brought out in the two papers. Taken together they provided a most valuable summary of current purification practice.

Electro-Detarring Unnecessary?

In the present paper reference was made to a coke works where it was claimed that tar extraction by centrifugal exhausters was so complete that it would not be necessary to include electro-detarrers in new installations. This was entirely contrary to experience in the U.K. Admittedly high-speed turbo-exhausters would reduce the tar-fog content to between 0.5 and 2.0 g/m³, but in the U.K. they would not tolerate even the lower of these concentrations going forward to ensuing plant, and electro-detarrers were always employed to secure less than 0.02 g/m³ at their outlet. The National Coal Board proposed to inflict financial penalties on contractors where this figure was exceeded.

Moreover it was not their practice to site electro-detarrers after the secondary coolers, but rather before them immediately at the outlet of the exhausters, then followed by the $(NH_4)_2 SO_4$ saturators on semi-direct ammonia recovery plants, or by naphthalene scrubbers on indirect ammonia recovery plants.

It was extremely rare—in fact almost unknown now—to use mechanical tar extractors and rather unusual to install any type of tar extractors before exhausters on coke-oven plants.

PURGING SPHERICAL HOLDERS

Dr. F. Schuster of Essen discusses a method of putting spherical gasholders into operation in relation to the different gases to be stored.

Spherical holders are constructed of welded steel plates from 15 to a maximum of 30 mm. thick. They are used in small sizes at pressures from 10 to 12 atmospheres and 5 to 6 atmospheres in the larger sizes. They are generally tested with air at 10% above maximum working pressures. To date the largest have a geometric volume of 20,000 m³ (700,000 cu.ft.) with a diameter of about 38.6 m (125 ft.); there is a tendency upwards.

The first operation is purging. Three methods are in use: (1) Purging with an inert gas in the usual way; (2) mixing with an inert gas such a quantity of air that the oxygen will not produce an explosive mixture; (3) as used by the Author (and apparently applicable only to cases where the inlet pipe goes near to the top while gas is withdrawn from the bottom) in which air is replaced in one operation by the gas to be stored together with inerts to a point just short of the ignition zone. Tables are given showing the safe limits with the usual types of gas to be stored.

The height of the riser pipe within the sphere is a determinant for the extent of the zone of mixing. Observations of air and inert content at exit constitute a factor of safety and the safe proportions can be mathematically confirmed. Precise calculation shows that it is sufficient to attain a higher percentage of oxygen, due to the fact that, at the point at which the upper and lower ignition points coincide, the quantity of gas corresponding to the initial lower ignition point can be calculated from the content of inerts.

THE HAMBURG STORY

Gas production and supply in the city and surrounding districts of Hamburg described by the Director, Herr G. Düwel, makes a very interesting story. The region served by the Hamburg Gas Company has a total population of 2.2 mill. people. Hamburg itself has a population of 1.8 mill., to which is added that of 70 communes in Schleswig-Holstein and Lower Saxony. Gas consumption is made up of 55% for lighting and domestic heat supply and 45% for industrial uses. A graph of fluctuations in annual demand shows a rise from about 250 mill. m³ (8,830 mill. cu.ft.) in 1938-39 to about 360 mill. m³ (12,700 mill. cu.ft.) in 1942-43, a severe drop to about 70 mill. m³ (247 mill. cu.ft.) in 1945-46 followed by a steep rise to about 390 mill. m³ (13,800 mill. cu.ft.) in 1957-58.

105 years Temperature Records

The growing use of gas for domestic and industrial space heating is increasing the relation between air temperature and the demand for gas. Monthly variations in temperature conditions are shown in a number of curves covering averages and extremes over the last 105 years together with curves of monthly output of gas for the years 1945-46 to date.

Market surveys show that from 1955-56 to 1960-61 an annual increase of 7.8% is to be expected in gas demand. Future planning, however, has been restricted to 5.6% to 1960-61 and 3% from that date.

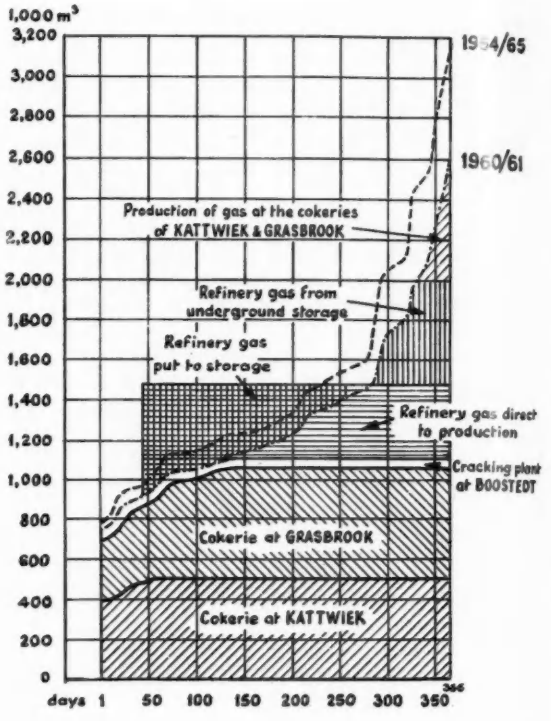
Coal remains the basic material for gas production. Gas is made in three coke-oven plants (cokeries) with a daily capacity of 2,650 tonnes of coal supplemented by an ' outside ' cokerie carbonising daily 700 tonnes. These cokeries take the base load for gas as well as for the majority of the coke used in the economic zone of Hamburg. For the future, the oldest of these plants is to be demolished and another kept shut down in reserve. Two large new cokeries to be erected at Grasbrook and Kattwick, with daily capacities of 3,560 and 4,000 tonnes respectively, will take the normal base load.

Underground Storage

Peak loads are taken by reformed natural and refinery gases and by underground storage. Deposits of natural gas are known and exploited at three points within or near the district served. The reforming (cracking) plant at Boostedt is described.

The resultant town-gas at 4,200 cal/m³ (440 B.t.u. per cu.ft.) consists of 83% cracked gas at 2,710 cal/m³ mixed with 17% of natural gas at 11,500 cal/m³. Refinery gases from the Esso Company's plant at Harbourg (a suburb) are taken at the rate of 75 mill. m³ per annum (2,600 mill. cu.ft.) to a cracking plant at Tiefstack. After the removal of sulphur, it is cracked in air-steam thermal plant to a calorific value of 1,700 cal/m³. The plant is described in some detail. Suitable terrain for underground storage was located at two points within the region—Reitbrook, 11 km. from the works at Tiefstack, and Neuengamme. The geological formations and operating plant are described. It is proposed to store refinery gas.

' At the time of publication of this paper there will be about 6 mill. m³ (212 mill. cu.ft.) in the reservoir. It is intended to withdraw quite large quantities from it as soon as the quantity in stock reaches 20 mill. m³ (706 mill. cu.ft.).'



The graph which we have prepared shows how the future demand for gas will be met.

(The main contribution to the discussion came from M. J. A. van den Heuvel, Head of the Fuel and Power Division, O.E.E.C. We have already published this in full on p. 60 of the ' JOURNAL ' *for October 8.)*

CALCULATING GASEOUS EQUILIBRIUM

Prof. H. Deringer, Switzerland, submits a new method (with formula and coefficient tables) for the calculation of the composition of gaseous equilibrium and of the reaction temperatures. ' Ten tables for reaction temperatures between 600° and 1,500° K comprise 2,660 figures.' With these tables the reckoning may be reduced to the minimum of time, as shown by examples given in the paper. However, in order to be able to give a sufficiently exact and quick answer to normal requirements, a much more complete set of tables should be available, including 37 tables with 26,413 figures. Such a work could be edited if specialists in the matter would show some interest in it.

(To be concluded)

I.G.U. TRANSACTIONS

Publication of these Gas Journal Abstracts of the proceedings at the 7th International Gas Conference has brought a number of enquiries for the complete transactions. Those interested should apply to Mons. R. H. Touwaide, General Secretary of the Union, at 4, Avenue Palmerston, Brussels 4. The pre-conference price for the 45 reports and papers was 15,000 lire (around £8/15/0).

Annual Meeting of Association Technique Looks at Future of French Gas Industry

THE meeting which was held this year in Paris with M. Antoine Bolzinger, President of the Association Technique de l'Industrie du Gaz en France—the 75th of the long series which began in 1874 with the creation of the Société Technique—in the chair, was in all ways worthy of its predecessors. Such is more or less the opening sentence of the Editor's introduction to the July issue of the *Journal des Usines à Gaz.*

The address by M. Le Guellec, President of the Administrative Council of Gaz de France, was a panegyric on the Association, which was, he said, a forum to which came men of goodwill, irrespective of rank or origin, to put forward their views in animated, sometimes even impassioned, discussion. ' You are an association of technicians. Let it remain so. Have yourselves the same high opinion which others have of your organisation, of the quality of your work.' He underlined the two principal factors which he thought they should keep before them—the rapid development and growing importance of natural gas and the growth of institutions of European range, at first specialised, today general in character, in the front rank of which stood the Common Market.

Gas in 2000 A.D.

M. Georges Combet, Director General of Gaz de France, delivered before an exceptionally large audience a lecture with the title ' The French Gas Industry in the Year 2000 ' in which he analysed the long-term possibilities of the industry.

He limited himself to the industry which distributes through pipes gas of a calorific value equal to or more than 4 ' thermies ' (say 420 B.t.u. per cu.ft.). Clearly the estimation of the future must take the form of some sort of extrapolation from data of the past.

One could proceed along three different lines: (1) By the ' direct method,' that of plotting the sales figures of the industry; (2) by an ' analytical method,' i.e., to analyse the sales of gas in each of its uses and to study the growth of each separately; and (3) by the ' global method ' one could consider the gas industry in relation to the whole of the energy supply and demand.

M. Combet discarded the first line of approach because today, as in the past, expansion of the industry does not take the form of a parallel rate of growth in the different fields of application. Each section of utilisation has ' its own law of growth.'

M. Combet turned to his third method. In default of a simple extrapolation from the total gas sales of the past, one could study the possible development of this industry among all the energy-industries of which it forms a part. Plotting the consumption of energy in France in terms of equivalent tonnes of coal, starting from 112 mill. in 1955, ' the objective fixed for the 3rd Plan of Modernisation in 1961 is 144 mill.' The expectation for 1975 is 220 mill. Taking these figures back to 1900 he finds a rate of growth of 1.9% per annum, giving a total consumption in the year 2000 of 350 mill. tonnes of coal equivalent.

But this figure takes no account of the growth of population nor of the growth in consumption of energy per head of population. The former is expected to increase from 44½ mill. inhabitants of today to about 57 mill. in 2000. The latter was estimated at 2.5 tonnes in 1955 and since 1900, consumption per head of population shows a mean annual growth of 1.6% which would mean a figure of 7 tonnes in 2000 which, applied to the estimated population in that year, gives a total energy consumption equivalent to 400 mill. tonnes of coal, i.e.—about three times the consumption of 1956.

At the present time 60% of the nation's requirements are met by its coal mines (50%) and by water power (10%). By 1975 it is expected that these sources will meet 44% of requirements. ' Beyond 1975, the possible development of these traditional sources of energy at competitive prices appears to be only very limited.' From now to the year 2000 it will be necessary to call upon other sources to meet the larger part of requirements—petroleum and natural gas, nuclear energy and, possibly, wind power and solar energy.

M. Combet analyses the possible supplies of petroleum and natural gas available in metropolitan France and in the territories of the French Union. He arrives at the conclusion that they may reach the equivalent of 200 mill. tonnes of coal, thus satisfying one half of energy requirements of metropolitan France. The other half may be met by coal and hydraulic power on the one hand and nuclear energy on the other.

Turning now to the ' analytic method,' M. Combet presented a most interesting detailed examination of the principal sectors of the utilisation of gas. He foresaw a vast expansion of the use of natural gas not only for industrial and domestic usage but for the generation of electricity. He predicted a natural gas production of 475,000 mill. thermies which, added to the 25,000 mill. of manufactured gas, gives a total of 500,000 mill. thermies (say 20,000 mill. therms). Electricity production would use 200,000 mill. of this, industrial purposes 200,000 mill., domestic 60,000, mill. other purposes 30,000 mill., and losses, etc., 10,000 mill.

' Until the day when, triumphing over its technical and economic difficulties, nuclear energy will effectively take up the load, it is the search for petroleum and natural gas in France and its overseas territories which presents the best chance of redressing, in the shortest possible time, the deficit in our energy balance sheet. These supplies are too uncertain to form the basis of a definite prophecy. There are however sound reasons for thinking that France will enter, in the course of the last third of the century, into an era of petroleum and natural gas, i.e., some 30 or 40 years after the United States.'

The number of technical communications—26—presented at this year's meeting, was somewhat smaller than that of last year. That on ' The Use of Chromotography

for the Analysis of Mixtures of Gases,' by Velut and Jourda, was published in full translation in our issue of August 6. An even more abstruse method seems to have the same uses with similar limitations. 'Mass Spectrometry Applied to the Gas Industry' was described by M. Jean Postif of the Landy Research Station with the 'spectrum' of a town gas. It is defined as 'a physical method for the identification of molecules.' M. Postif enunciates the principle and describes the apparatus—all this will no doubt be intelligible to a few.

The papers as a whole reflect the pre-occupations of our French colleagues in the gasification and reforming of petroleum products particularly in the transmission and commercialisation of the deposits of natural gas from Lacq in the South-west.

Reforming and Cracking

M. Laligrand and M. Salvadori of the Research Station at Landy gave an account of work on the simplification of the apparatus P9 (patented by Gaz de France and M. Bolzinger) for reforming hydrocarbon gases. The steam for the reaction is introduced by the recycling of some of the hot gas produced, which evaporates water in a hydraulic main, and the waste-heat boiler is dispensed with. In the tests reported catalysis was effected either with activated aluminium or a nickel-impregnated agent. Gas of town quality was obtained by enrichment with propane.

M. Aufauvre and M. Aulagnier described modifications of an Onia-Gegi plant at Montluçon, designed for the gasification of heavy oil, to enable it to deal with commercial propane. Here again the gas produced was enriched with propane producing a mixture perfectly interchangeable with town gas.

Improvements in a GEIM and apparatus P2 were described by M. Michel of the Rhone-Auvergne Group. By co-ordinating the injection of steam with the feed of propane-air and replacing the existing catalyst by a more active nickel catalyst, lower temperatures can be used with an increase in capacity of about 50%. Thanks to the reversibility of the reactions, the presence of steam brings the hydrogen content to 30% while avoiding the production of carbon black.

M. Raboul and M. Cozdenmat described the Stark process for the continuous reforming of propane. It is a generator of the externally-heated type designed to give the greatest possible heated area of the catalyst in proportion to its volume. In the usual design the catalyst is contained in a number of relatively small diameter tubes. In the Stark process the gas-steam-air mixture is introduced into the centre of the cylindrical generator. It passes through a succession of concentric cylindrical annuli in the outer of which is placed the catalyst. Partial decomposition of the hydrocarbon to be reformed takes place in the inner passes before it reaches the catalyst, the influence of which is thereby accelerated to a point where the rapidity of decomposition produces neither carbon nor tar. The plant is self-supporting in steam by way of a waste-heat boiler.

After preliminary tests the thickness of the layer of catalyst was reduced to 90 mm. so that the difference between the extremes of temperature was reduced to about 50°. Tests with and without the catalyst are reported. The gas obtained without the catalyst was somewhat higher in impurity content and would therefore require further treatment.

M. Cornebize described 'a new type of gasworks' at Quimper, with a daily capacity of 70,000 m³ (say ¼ mill. cu.ft.) obtained by the catalytic cracking of crude heavy oil on the lines of the Onia-Gegi process tested at Cahors. After ten months working it appears that some of the after-treatment of the gas might be simplified (provided that there was no trouble with effluents) which should reduce the cost of manufacture

Catalysts

Madame Vignes, Research-Engineer at the Research Station of Landy, contributed a paper—'Catalysts Employed in the Gas Industry'—described by the President as 'one of the most original of the meeting.' Her investigations in the laboratory were directed towards two principal objectives; to ascertain how the catalyst behaves in the process to which it is applied, to ascertain all the physical, chemical and mechanical characteristics of the catalyst. The following is Mme. Vignes' conclusion in full:

'From the broad lines of this investigation, there emerges the fact that in spite of a similitude of characteristics in general there is a great diversity in detail among the catalysts used by Gaz de France which corresponds to the same diversity in their possible applications.

'It is therefore illusory to think of a classification of the values of the catalysts. Some classification, however, would appear to be justified, in the light of the results obtained but only within the same group and in the same kind of application. It is premature to give here the results of such a classification if only because all the catalysts which might be useful have not been listed.

'One can, however, say that we are on the way to rendering to the operator the services which he has the right to expect of us, thanks to the different methods of investigation put in hand and related one with another in the course of this paper.

'Among these possible services* may be mentioned,

1. A control of the permanence of quality of the catalyst in successive deliveries (test of conformity).
2. An examination of new catalysts, intended for new processes (test of agreement).
3. An examination of the resistance to sulphur of the life of the catalyst, and an investigation of activity after use (cyclic process) or after regeneration (continous processes). This will include tests of reforming.
4. Finally, a study directed to replies to precise questions posed by the operator, in case of anomalies noted in working.'

Bottled Gas

M. Charles Flavian discussed the evaporation capacity of bottles containing propane and butane for sale. Previous work is reviewed—work which he said was based more on theoretical than experimental data. He claimed to redress the balance and presented his results.

M. Degent and M. Besnard of Landy submitted a

** These 'possible services' are, it is suggested, a promise of the results of future investigations rather than results already achieved.*

study of the formation and elimination of gums from gas. When gas at exit from holder contained gums promising results were obtained by injecting steam counter-current to the gas in the ascending branch of the outlet main and atomised water in the descending branch, the latter to produce shock cooling of the gas and steam. The preparation of this paper was prompted by gum difficulties in the Paris distributor system.

Underground Storage and Natural Gas

Considerable experience has now been accumulated of the underground storage of coke-oven gas in the water-bearing strata of Beynes, near Versailles. M. Richard and M. Bourlay reported the first results of working after the injection of 83 mill. m³ (2,900 mill. cu.ft.) and the withdrawal of 18 mill. m³ (380 mill. cu.ft.) during 1957. Another site for underground storage is being developed at Lussagnet in the South-west in order to assist in dealing with variations in demand for the natural gas at Lacq. The storage was partially exploited towards the end of 1957. Its possibilities will not be known until the end of this year when a stock of 150 mill. m³ (5,300 mill. cu.ft.) is contemplated with a daily withdrawal of 1.3 mill. m³ (46 mill. cu.ft.).

The Ste. Nationale des Pétroles d'Aquitaine contemplates the production from the deposits at Lacq by 1961 of 20 mill. m³ (700 mill. cu.ft.) of crude gas per day, equivalent to about 13 mill. (460 mill. cu.ft.) of purified gas. Consumption in the South-west is expected to rise to 5 mill. m³ per day leaving 8 mill. to be sold outside the region. The paper by M. Lecœur, Technical Director of the Cie. Française du Methane, contains a sketch map of the pipe-line as it is now in construction and as it is proposed to be in the future, including the extension to the Paris region. After a brief survey of the possible fluctuations in demand, the author discusses means for meeting these requirements —including reserve storage capacity of pipelines, underground storage, and possibly some 'load-shedding' at the peak points. Interruptible contracts are widely used in the U.S.A., particularly in the industrial market, but this practice could be imitated in France only with the greatest prudence.

M. Reynes, also of the South-west, recounted experience with the laying and butt-welding in situ of 24 in. expanded steel pipes—a new feature of long-distance gas transmission in France, arising particularly in the distribution of the natural gas at Lacq.

M. Hubert Gaudry described with diagrams and photographs the principle and method of construction of his invention automatically to correct indications of a volumetric meter operating at varying pressure and temperature. Range of pressure is from 1 to 5 atmospheres, but this could be extended to 10 atmospheres.

Distribution

There followed five papers dealing with problems of distribution. In the Valenciennes district three examples were described by M. Richard and M. Mazet of distributions at medium pressures (up to 14 lb. per sq. in.) with reducers at strategic points or to individual groups of consumers. M. Perret and M. Bertrand describe an experiment, with a year's experience, in the use of a low pressure distribution in plastic pipes (PVC.) at Versailles. The total length of 4 in. diameter pipe is about a kilometre (0.62 mile). So far the result is satisfactory but the line is being carefully watched.

Mlle. Desnos (in collaboration with M. Gaudry) had continued her work on the effect of the hydrocarbons contained in town gas on the rubber used in pipe jointing. The behaviour of such jointing material is found to depend mainly on the degree of saturation of the gas and not on the partial pressure of the hydrocarbons. Facts observed in the laboratory encourage the possibility of substituting for the current practice of 'rebenzolising' the use in very small proportions of hydrocarbons with much lower vapour tensions at ordinary temperatures. If a suitable hydrocarbon could be found such a technique might have economic advantages. The subject is discussed from a theoretical point of view but also with results of experimental work.

M. P. Renouard contributed a statistical study of leakage in distribution systems. The problem of unaccounted-for gas is of growing importance in France. In the past three or four years, particularly in regions where there has been a change in the nature of the gas distributed a significant increase in these losses has been observed. The percentage over the whole of Gaz de France has passed 10%, which corresponds to a loss of the order of 300 mill. m³ (10,600 mill. cu.ft.) of gas per annum. This study shows that the percentage of losses in distribution follows relatively simple laws of probability and that it is possible to calculate the point at which definite steps to reduce it would be a paying proposition.

And finally, M. Moyrand and M. Azema described a test distribution of propane-air in a part of the little town of Agen near Cahors in preparation for an ultimate distribution of natural gas from Lacq.

Burners and Heaters

Improvements in domestic burners adapted to different types of gas were described and discussed by M. Claude Dupont of the Gennevilliers Research Station.

Two years ago investigations were commenced of the role of pilot-flames in stabilising the flames of gases with a low rate of ignition. The present tests are an attempt to apply the results to burners adaptable to different gases. The first part of the paper shows an experimental burner in which the influence was studied of such factors as, the number of pilot flames, the distance between the pilots and the principal flames, the output of the pilot flames, the rate of primary air supply, the nature of the gas used, the diameter and distance from edge to edge of the orifices. The second part describes the application of the results to a standard type of burner serving the hot-plate of a cooker to work with town gas, butane-propane and natural gas. The performance was generally satisfactory but further improvements will be studied, particularly in the rate of primary air supply to the burners. The paper is illustrated by drawings, photographs and graphs.

The new techniques of construction of overhead radiators and their grouping in high power batteries for the heating of public assembly buildings poses a number of problems to the constructor himself as well as to architects and installation engineers. M. Maurice

Combet of the Gennevilliers Research Station reported investigation work in the working characteristics of a number of such assemblies with the object of establishing rules of practice in this field to ensure their efficient and safe working, the latter relating to immunity from atmospheric pollution and fire risks. The elements are arranged in single or double line in batteries or in circles in 'lustres.' The average radiant efficiency is of the order of 40%. Drawings and photographs show details of distance ignition, evacuation of products of combustion, distances from floor and ceiling, etc. The author prefers concentrated overhead radiant heaters to smaller lateral heating units. The data in the paper should be of great practical value.

The paper by M. Gerard and M. Chazelle of the Industrial Gas Service described an example of the advantages and competitive use of gas in a furnace for the reheating of small steel billets for press forging. Coke oven gas was able to hold its own against oil-firing by reason of a higher production per unit area, both overall and of the furnace floor and of the high rate of heating. Details and results are given.

'Industrial Burners for the Use of Natural Gas. Stabilisation of Flames by Means of Pilot-Flames,' is the title of an important practical contribution by M. Jean Melmoux of the Gennevilliers Research Station. In the development of the uses of natural gas, industrial applications, he says, represent the most important part. Experience both in France and elsewhere has shown however that the burners must conform to certain rules if safe working is to be achieved. The flame is particularly liable to 'blow off.' It was in order to establish these rules that the Research Station undertook systematic study of the conditions for the safe working of industrial burners.

The principal safety measure to ensure stability is the use of the pilot flame. In the first part of the paper previous work is discussed. In the second, details of the experimental burner used in the investigations reported are given with results obtained. In the third part the standard Gaz de France burner is described together with sketches of a number of commercially produced burners, Selas, North American, Sofim, 'surface combustion,' and Kuppersbusch. It is hoped that the paper will 'remove considerably the empiricism which has prevailed in the utilisation of pilot flames' which has been the surest method of ensuring the stability of the principal flame and the safe use of natural and other rich gases in industrial burners.

Decisive Advance

'Reactivity of Solid Fuels' was one of the most important papers presented to this meeting of the A.T.G. It is claimed to mark a decisive advance in the technology of this important subject. It is possible here only to indicate the scope of the work done and the results achieved.

In a preface to the paper, M. Delsol writes that one of the first tasks in the 1955 reorganisation of the Research Department of Gaz de France was to elaborate a new programme of work. 'Among the subjects retained, was the study of reactivity directed to the kinetics of the gasification reactions interesting to the gas industry.' M. René Fort of the Research Department was asked to draw up the programme, and Prof. Guérin, Professor of Industrial Chemistry at the Faculty of Science of Nancy, who was already in collaboration with the Research Department of Gaz de France in the problem of the reactivity of coke and who was working with his students on the mechanisms of the reactions of gasification, to undertake in his laboratory the research envisaged in the programme. This report is presented by him and M. Fort with the collaboration also of M. Michael Montash, Director of the University of Nancy.

The paper is long and detailed. Its conclusions are summed up in the sentences, 'that reactivity can with difficulty be represented by a single figure, even as a function of temperature. It is therefore indispensable to decide upon operating conditions, choosing these so as to find a region where the influence of the several factors is least felt. The authors remind us however that the reactivity of fuels is only one characteristic the importance of which can, in certain cases, be secondary.'

Collaboration

'Biological Dephenolisation of Effluent Liquors from Cokeries and Gasworks' was the subject of a collaboration between Prof. Raynaud and M. Bizzini of the Pasteur Institute and M. Vincent and M. Vignes of the Research Department of Gaz de France. They discovered a bacterium, closely related to *pseudomonas fluorescens* which can support fairly high concentrations of phenols and destroy them almost completely. Experiments with a pilot plant working intermittently were described which revealed certain difficulties. These were in large part eliminated in a continuous plant of semi-industrial scale which is also described. Some costs are given.

Prevention of Hot Cracking in Welding

HOT cracking can take place in weld metal which is still at a high temperature—in fact very soon after the weld metal has solidified. The metal is very weak at this stage, and under certain conditions the contraction stresses set up as the joint cools are sufficient to cause cracking. The most common circumstances in which this occurs are conditions of high restraint—i.e., when the thickness of the plate being welded, and the design of the joint, do not allow any movement as the work cools.

The first precaution to take against hot cracking is to ensure that the weld is strong enough: A slight increase in throat thickness is often all that is necessary to cure this fault, making the weld strong enough to withstand contraction stresses. It is impohrtant, too, to choose a welding sequence which will minimise stress—the 'step-back' and 'planned wandering' methods are examples.

An example of insufficient strength in welds is the very common occurrence of 'crater cracking.' This is usually caused by breaking the arc too suddenly, leaving

very thin metal in the crater. While the weld is capable of withstanding contraction stresses where it is of full section, the thin crater metal has insufficient strength, and cracks. Care should therefore be taken to fill craters sufficiently to counteract this.

Plate fit-up can also influence hot cracking and as good a fit-up as is possible should be made.

The choice of electrode is important. Although the use of an electrode which will give good mechanical properties is always desirable, other characteristics may be equally essential in the prevention of hot cracking. Such features as depth of penetration and weld contour must be considered since they affect the effective throat thickness.

When welding mild steel the carbon and sulphur contents of the parent metal can have a considerable bearing on any tendency towards hot cracking. This is because part of the parent metal is melted, and the deposited weld metal can thus pick up sulphur and carbon. An increase in the carbon content may accentuate segregational effects and increase the tendency towards hot cracking.

The small amount of sulphur normally present in steel exists as small globules of high melting point manganese sulphide evenly distributed throughout the metal. If, however, there is insufficient manganese to form this compound the sulphur combines with the iron as iron sulphide. This has a lower melting point than the steel and as a result there is a period during solidification when the solid steel grains are surrounded by a film of still liquid iron-sulphide. In this condition the material is understandably very weak and unable to resist contraction stress. These effects may be counteracted to a large extent by the use of electrodes having a basic flux which has a cleansing action on the molten pool of metal.

One of the most frequent occurrences of hot cracking is in fully austenitic weld metal, particularly in multi-pass welding on heavy sections. This is one of the inherent characteristics of this type of metal, which is customarily prevented by the use of an electrode giving about 5% or more of ferrite in the austenitic structure; there are a large number of electrodes of this type. Where ferrite is not admissible because of service considerations, such as the need for stability at high temperatures, Quasi-Arc's Chromoid No. 5 can be used. This electrode contains less than ½% ferrite, and was specially designed for all-position welding of stressed components in heat and corrosion-resisting steels, for joining dissimilar steels, and for welding stainless clad steels.

In welding austenitic steels particular care should be taken to fill the crater properly, and to ensure that the weld metal does not get too hot. Narrow runs should be deposited and wide weaves avoided and as small a molten pool as possible should be maintained. Speed of travel should be as high as possible, since this is consistent with good welding.

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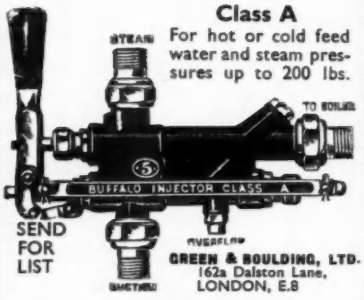

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J. SWAN,
Secretary to the Board.

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Divisional General Manager.

Millstone Lane,
Leicester.
October 14, 1958.

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